THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXV. No. 1934.] LONDON, JUNE 5, 1900. [52ND YEAR. PRICE 6d.

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FIRE-CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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Yield of Gas per Ton . 10,500 Cubic Feet.
Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

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The Wallsend & Hebburn Coal Company, Ltd.
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W. RICHARDSON, Fitter.

CARSON'S PAINTS
THE ORIGINAL
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Sent out in Dry Powder with Oils for mixing separate.
Is the most Durable Paint for all
EXPOSED IRON AND WOOD WORK.

FERRI-SILICON,
A PAINT MIXED READY FOR USE,
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Special Quotations for Quantities.
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Parker's Imperial Black Varnish,
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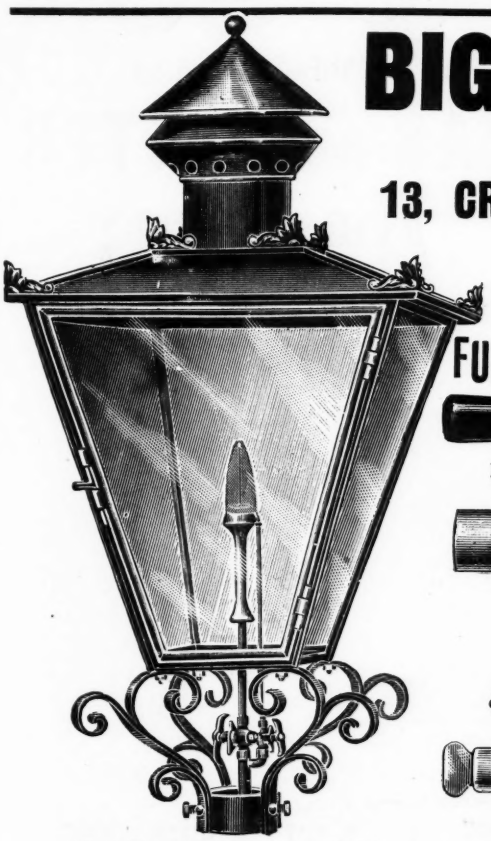
LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.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GAS AND WATER ENGINEERS,
13, CROSS STREET, FINSBURY PAVEMENT,
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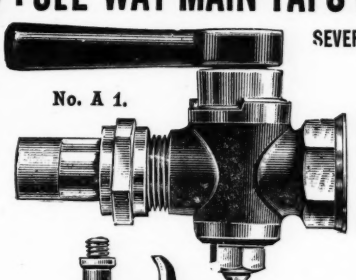
SEVERAL DESIGNS SHOWN BELOW.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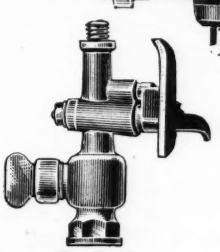
SUPERIOR QUALITY AND FINISH IN GUN METAL.

LANTERN TAPS.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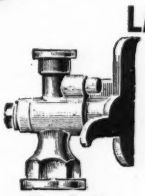
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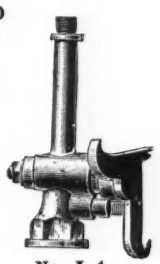
No. A 12.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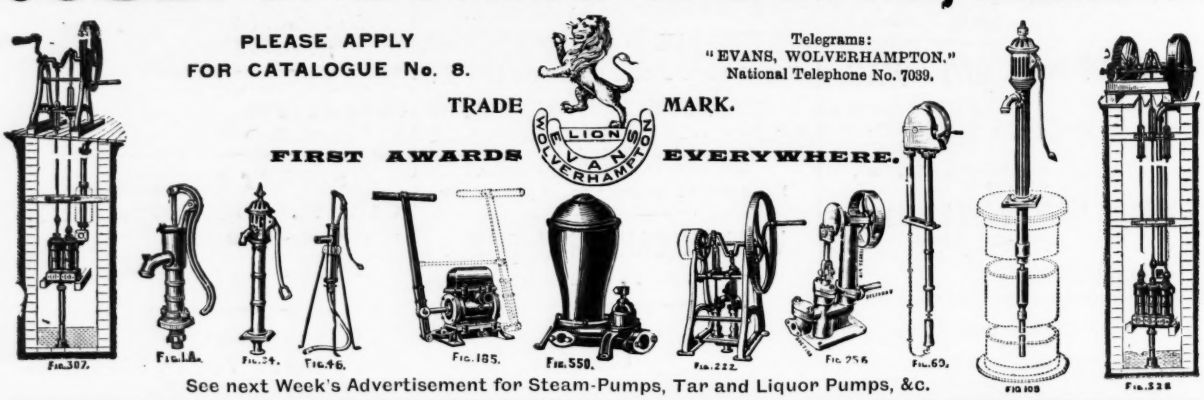

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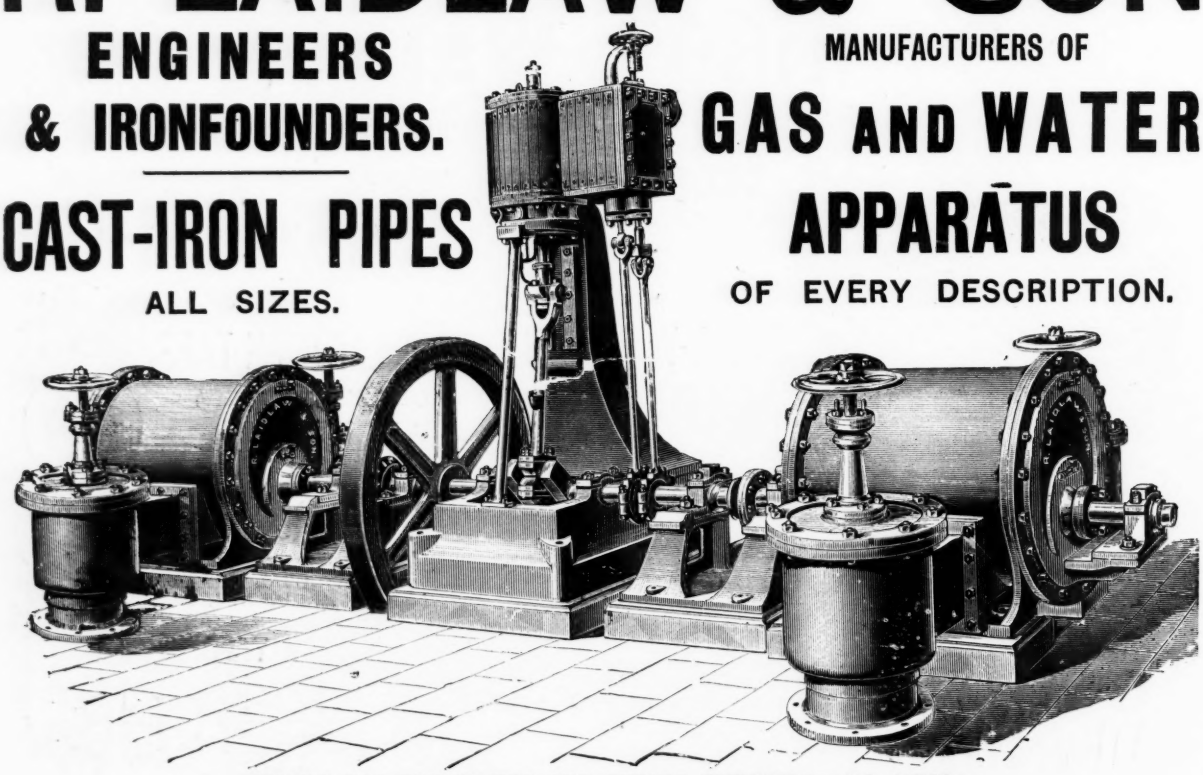

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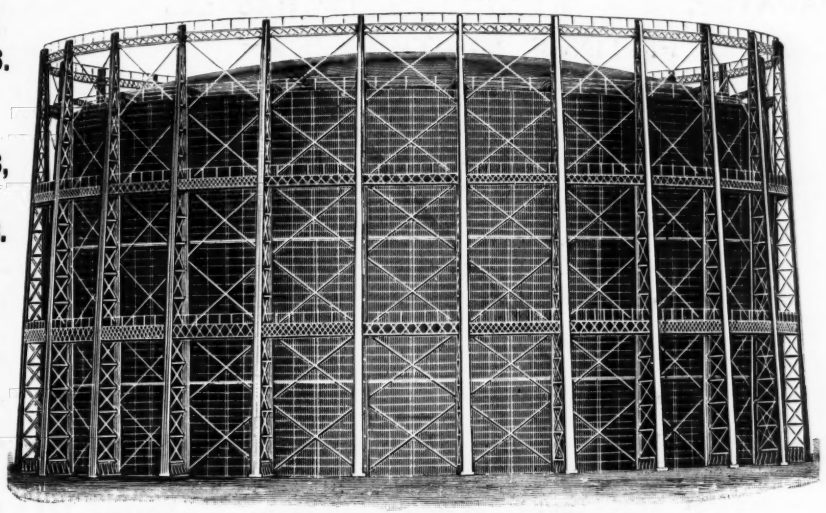

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THREE-LIFT GASHOLDER. Capacity, SIX MILLION cubic feet.
240 feet Diameter by 45 feet Deep each Lift. Erected at Glasgow, 1893.

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Manufacturers of

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We are now supplying our Wet Coin Meters in Cast-Iron and Tin-Plate Cases, both Ordinary and Compensating; also Dry Coin Meters in Tin-Plate Cases.

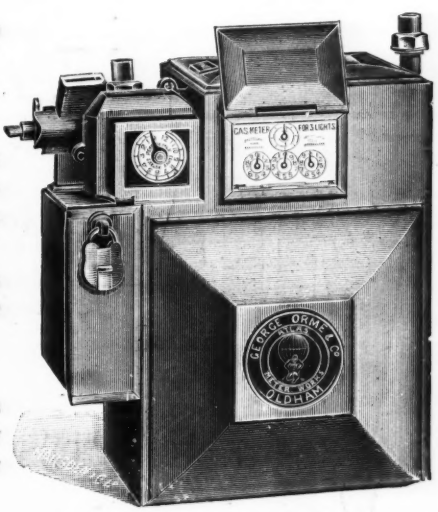
WET COIN METER IN CAST-IRON CASE.

A large number of these Meters are in use, and giving satisfaction.

The Mechanism is very simple; and there are no springs or complicated parts to get out of order.

We supply them to work with **1d., 1s., or any other Coin desired.**

The Selling Price of Gas can be changed *in Situ*, and any number of feet delivered, as may be required.



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PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

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DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

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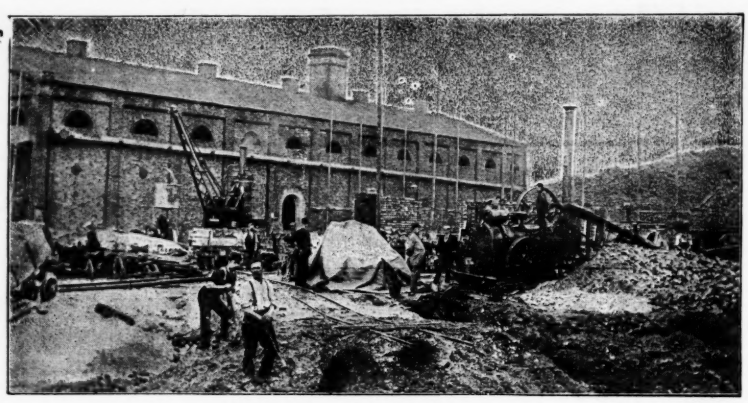
Special Facilities for RECONSTRUCTING GAS-WORKS.

CONDENSERS, SCRUBBERS, WASHERS, EXHAUSTERS, TANKS, and every REQUISITE.



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GASHOLDER TANKS AND MAIN LAYING.

MOBBERLEY & PERRY

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Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

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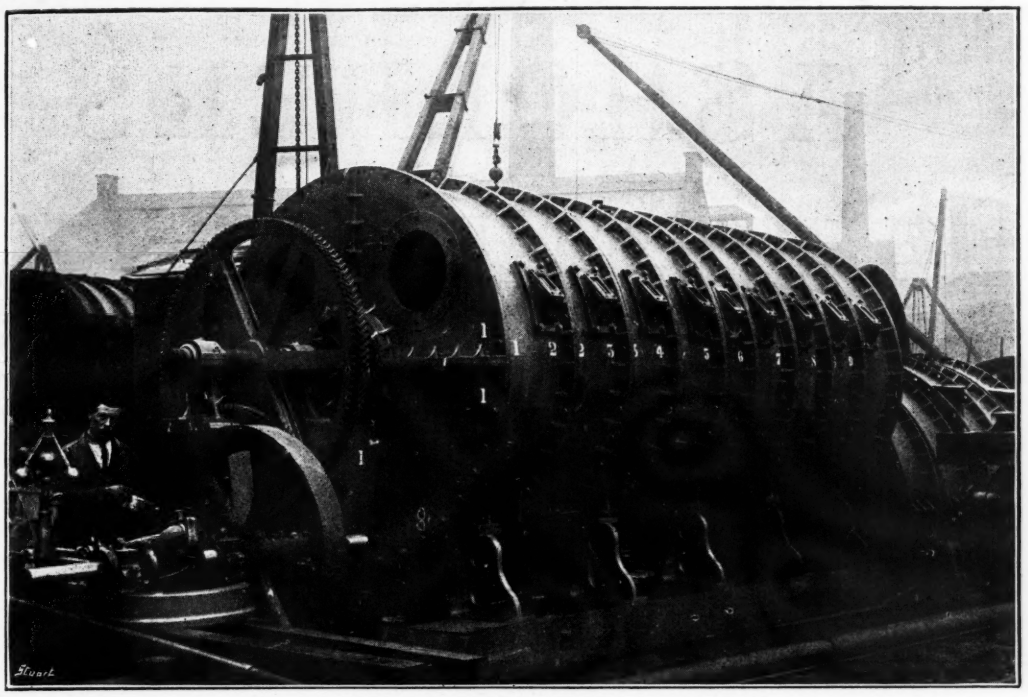
PATENT "NEW" SCRUBBER-WASHER

All Sizes from 50,000 to 5,000,000 Cubic Feet of Gas per Day.



The "NEW" Scrubber-Washer can be arranged to suit all cases of the Washing of Gases with Liquids.

NOTE: Orders already received in 1900 for MACHINES to deal with 33,800,000 Cubic Feet of Gas per Diem.

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PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

STRUCTURAL IRON

AND STEEL WORK.

BRIDGES,

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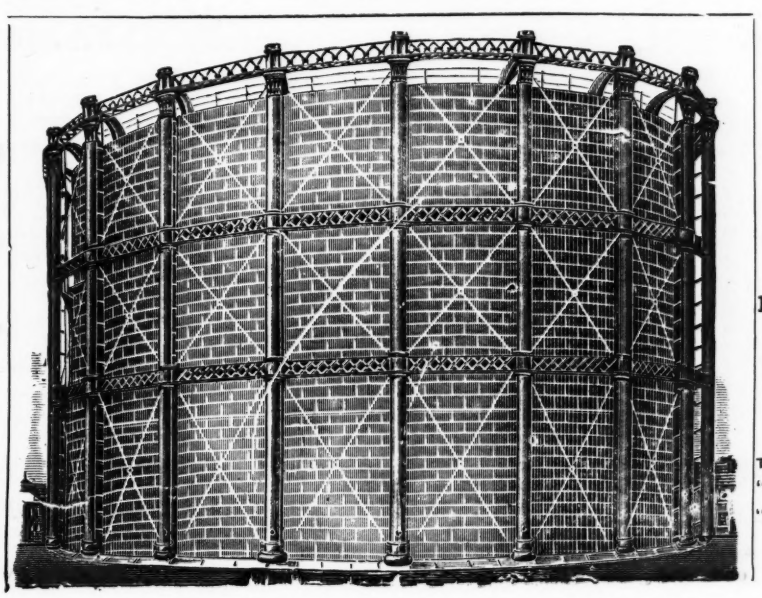

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STAFFORDSHIRE.

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OF EVERY SIZE AND DESCRIPTION.

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Carburetted Water-Gas Plant.

SPECIAL DESCRIPTIVE CATALOGUE ON APPLICATION.

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Over 120 now in use.

Cutler's Patent Freezing Preventer

For keeping Cups of Gasholders free from Ice.

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Telephone: No. 1332.

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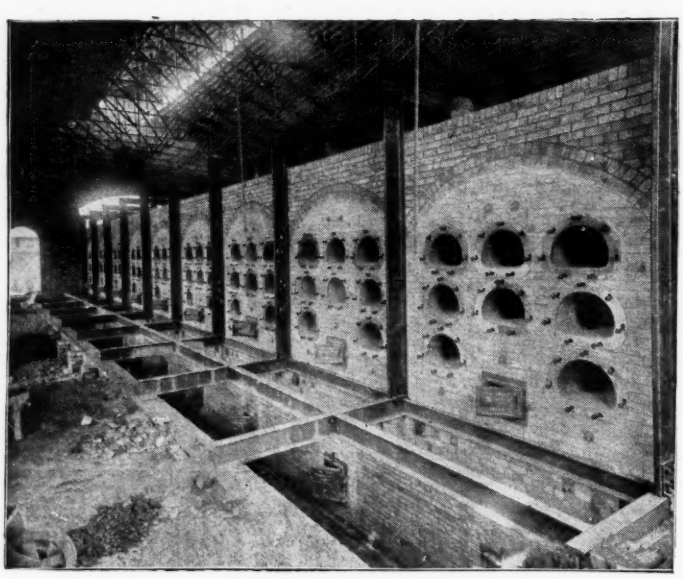

Engraved from a Photograph taken during the Construction of our Regenerator Settings.

RETORT-SETTINGS

OF EVERY DESCRIPTION
INCLINED, HORIZONTAL,
REGENERATOR, GENERATOR,
and DIRECT FIRED.

SHALLOW REGENERATORS A SPECIALITY

MANY INSTALLATIONS.
EXCELLENT RESULTS OBTAINED.

RETORTS RE-SET.
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COAL AND COKE-BREAKING AND CONVEYING MACHINERY.
BUILDINGS, ROOFS, &c.

ARROL-FOULIS

PATENT HYDRAULIC MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS

SIR WILLIAM ARROL & CO., Ltd., Sole Makers,
DALMARNOCK IRON-WORKS, BRIDGETON,
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GASLIGHT & COKE COMPANY—
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East Greenwich
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Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

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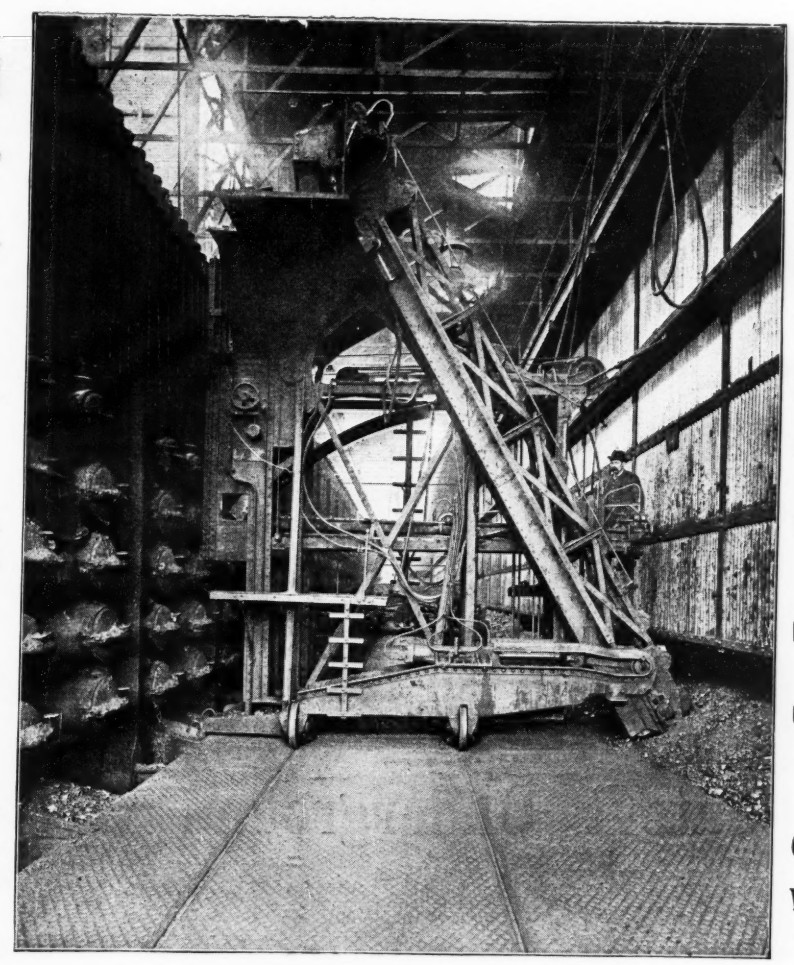

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HAGUE CORPORATION GAS-WORKS—
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CLEVELAND GAS-WORKS—
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OVER 200 MACHINES ARE AT WORK OR IN COURSE OF CONSTRUCTION.

ROTHERHITHE GAS-WORKS.

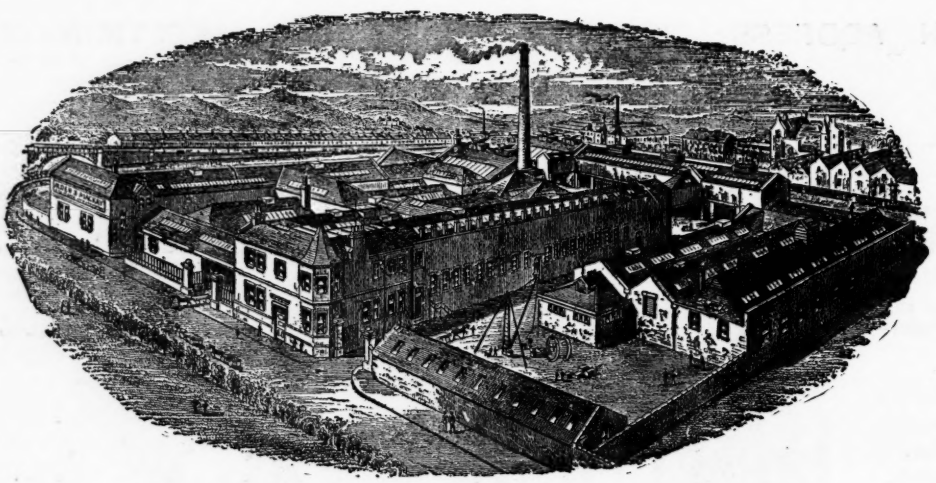
THE TIME TAKEN TO DRAW AND CHARGE EACH RETORT BY THESE MACHINES AVERAGES

ONE MINUTE.

ALDER & MACKAY

ESTABLISHED 1850.

GAS-METER MANUFACTURERS.



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Dry Meters in Cast-Iron Cases.

Wet and Dry Prepayment Meters.

Green's Patent Underground Wet Meters.

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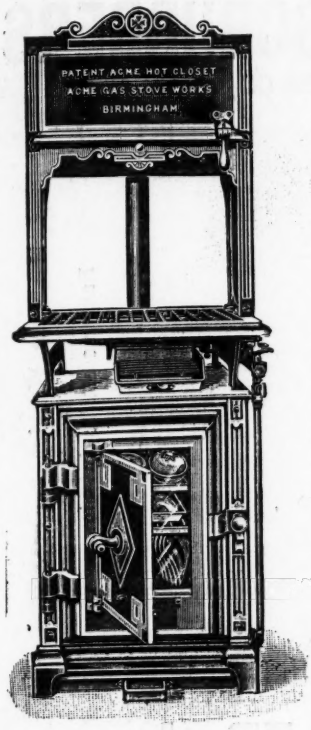
THE LATEST AND MOST SUCCESSFUL DEVELOPMENT IN GAS-STOVES.



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Fitted with the Patent

HOT CLOSET & GLASS DOOR,

Has been a long-felt want in all Households, and costs nothing extra to Heat as all the Waste Heat from the Oven is utilized.

WRITE FOR PARTICULARS.

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Eagle Range Gas-Stove Co. Ld.

ACME GAS-STOVE WORKS, BIRMINGHAM.

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SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

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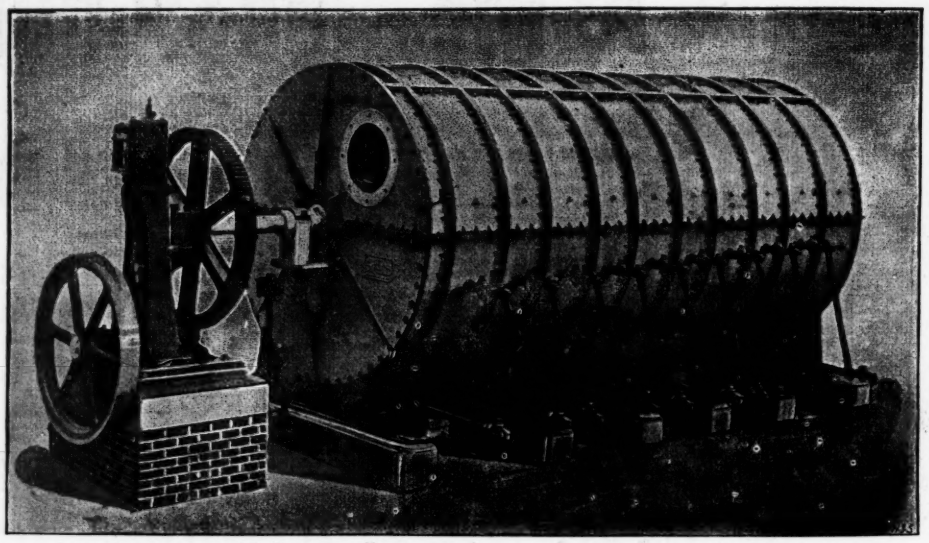
630,000,000

Cubic Feet of Gas per day are now being Purified by

PATENT "STANDARD" WASHER-SCRUBBERS

which extract ALL the Ammonia and a large proportion of the CO_2 and H_2S.

Prevention of Slip of Gas Unwashed.
Strength of Liquor Concentrated.



Maximum Washing Surface.
Easy access to interior.

PHOTO. OF MACHINE (ONE OF TWO) RECENTLY ERECTED AT THE DEVON STREET WORKS, BIRMINGHAM.

KIRKHAM, HULETT, & CHANDLER, LTD.,

3 & 4, PALACE CHAMBERS, BRIDGE ST., WESTMINSTER, S.W.

AMERICAN GAS OIL

SOLE IMPORTERS—

ANGLO-AMERICAN OIL COMPANY, LIMITED.

This well-known quality of Oil is used at most of the Corporation Works and Companies' Works throughout the United Kingdom. Contracts have also been entered into with several of the large Railway Companies.

LARGE STOCKS. PROMPT DELIVERY.

Stock of about 30,000 Tons is usually carried by us at our Installations at Avonmouth, Birkenhead, Barrow, Manchester, and London.

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CARBURETTED WATER-GAS PLANT

These instances are all from the LONDON designs of Messrs. HUMPHREYS & GLASGOW.

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Copenhagen	700,000	Coventry	600,000	Lawrence, Mass.	400,000
Copenhagen (Second)	2,500,000	Coventry (Second)	600,000	Commercial Gas Co.	850,000
Belfast	1,700,000	Bordentown, N.J.	125,000	Commercial (Second)	850,000
Belfast (Second)	4,500,000	Winchester	225,000	Commercial (Third)	1,250,000
Brussels	750,000	Shanghai	225,000	Rotterdam	850,000
Brussels (Second)	750,000	Stockport	600,000	Dorking	150,000
Liverpool	3,500,000	Norwich	1,000,000	McKeesport, Pa.	500,000
Liverpool (Second)	4,500,000	Holyoke, Mass.	600,000	G.L.&C.Co., Bromley	3,750,000
Tottenham	750,000	St. Joseph, Mo.	750,000	G.L.&C.Co., Nine Elms.	2,750,000
Tottenham (Second)	750,000	Lea Bridge	350,000	Durham	200,000
Santiago de Cuba	400,000	Lea Bridge (Second)	350,000	New York	4,000,000
Swansea	750,000	Stockton-on-Tees	500,000	Scarborough	800,000
Manchester	3,500,000	Edinburgh	2,000,000	Perth, W.A.	125,000
Brighton	1,750,000	Guildford	350,000	Bremen	550,000
Preston	1,400,000	Brentford	1,200,000	Maidenhead	225,000
New York	1,200,000	Syracuse, N.Y.	850,000	Epsom	225,000
Southport	750,000	Bridlington	150,000	North Middlesex	150,000
Bath	1,000,000	Middlesbrough	1,250,000	Wandsworth	1,800,000
Newburg, N.Y.	350,000	Croydon	1,250,000	Aarhus	800,000
Newburg (Second)	250,000	L. & N.W. Ry., Crewe	700,000	Falmouth	150,000
Hoylake	125,000	Taunton	225,000	Southampton	800,000

SINCE JANUARY 1ST, 1899.

Hartlepool	750,000	Brussels	1,000,000	Staines	600,000
Utrecht	1,000,000	Brighton (Second)	1,850,000	Commercial (Fourth)	2,000,000
Deventer	150,000	Stockport (Second)	600,000	Dublin (Second)	2,000,000
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Bournemouth	1,000,000	Maidenhead (Second)	225,000	Birmingham (Swan V'ge)	1,500,000
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Dublin	2,000,000	Sydney (Harbour)	500,000	Tunbridge Wells	1,000,000
Posen	450,000	Sydney (Mortlake)	500,000	Hebden Bridge	200,000
Dunedin (N.Z.)	150,000	Manchester (Second)	3,500,000	Chorley	300,000
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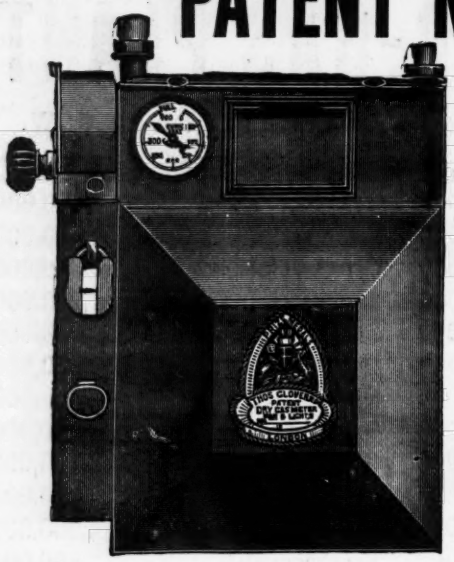

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EDITORIAL NOTES.

The South Metropolitan Bill to be Opposed in the Lords.

AT Thursday's meeting of the Court of Common Council of the City of London, Mr. A. C. Morton moved that the Town Clerk be instructed to call the attention of the Northern Metropolitan Local Authorities to the South Metropolitan Gas Bill, with the object of uniting them in further opposition in the House of Lords to that part of the measure which proposes to take power to purchase the Surrey-side district of the Gaslight and Coke Company. The motion was adopted unanimously, from which it appears that the Company are to be again attacked for offering to put themselves in a position to co-operate with their neighbours in carrying out a recommendation of the Powers of Charge Committee of last session. Nothing else was to have been expected. The position of the two Gas Companies, as well as of all the gas-consuming interests of the area north of the Thames served by the Gaslight and Coke Company, is anomalous; and how all these relations are to be rearranged without inflicting loss upon somebody, will in all probability be found beyond the wit of man to suggest.

The state of affairs as they at present exist is easily described. When the last amalgamation of the Gaslight and Coke Company—that with the London Gas Company—was effected in 1883, the Board of Trade insisted that the consumers in the Surrey-side district of the Company should always have their gas at the South Metropolitan charge for the time being. The amalgamating Company, whose intention was then to proceed to the absorption of the South Metropolitan Company, not only accepted this condition, but also the consequential obligation to supply all the public lights in the whole of their district at the same rate. There were those who shook their heads at the time over this engagement; but the difference of price between the two Companies was not great, and it appeared to be diminishing. The subsequent arrestation of the course of amalgamation in the interest of the Gaslight and Coke Company, changed the engagement into an "entanglement;" and the subsequent history of the big Company did not tend to justify the wisdom of those who went into it so lightly. Meanwhile, the obligation became a valuable consideration to the Northern Local Authorities, who thus found themselves sheltered against those economic vicissitudes which by last year had constrained the Gaslight and Coke Company to charge their private consumers 11d. per 1000 cubic feet more than the South Metropolitan price. When the same authorities took up the complaint of the private consumers against this difference, they could not resist the evidence that the excess in the north was partly due to the exceptional and unnatural arrangement governing the price of gas for the public lighting. Here, then, was an economic wrong which might be redressed by the simple device of severing the transpontine connections of the Gaslight and Coke Company. Relieved of their "entanglement," the Company could save something for the ordinary consumers. But this remedy appears to the interested Local Authorities to be worse than the disease. They are willing enough that the private consumers of the Gaslight and Coke Company should get their supply cheaper; but they naturally object to be deprived of the tangible, if illegitimate, advantage they derive from the actual condition of things.

Their desire to retain what they have, and still defend the cause of the private consumer, is, as we have called it, perfectly natural. No public lighting authorities could be expected to consent to give up a discount worth from £30,000 to £50,000 a year without receiving some sort of compensation. The difficulty is to formulate a scheme to the satisfaction of all parties. Mr. Littler fought the point before Mr. Oldroyd's Select Committee. Mr. Oldroyd himself thought the difference immaterial, inasmuch as the consumer and ratepayer north of the Thames has to pay gas bills and rates out of the same pocket. Mr. Littler disputed this; contending that what the Local Authorities pay for public lighting goes immediately into the pocket of the Gas Company, from which it does not necessarily emerge. He treated the £30,000 a year as an asset, capitalizing out at a million sterling, which the Gaslight and Coke Company would realize by the act of parting with their southern property to the South Metropolitan Company. It is fair to say that the latter Company have not taken into consideration this element of

value in the estimate they have published of the worth of this property to them. But if the question were to go to arbitration, as some desire, it would clearly be their duty to bring this and every other pertinent consideration before the Court. Mr. Littler's speech was largely addressed to the particular aspect of the sliding-scale which was so evidently in the mind of the Committee—that it ensures for the private consumer the benefit of all economies secured by the Company. This he denied—declaring that the Company might put it into their cash reserve, and afterwards use it for paying unearned dividend. Mr. Littler failed to impress the Committee; and accordingly he reserved for his clients, the City Corporation, the constitutional right to appeal to the House of Lords' Committee which it has now been agreed to exercise. How the difficulty is to be overcome is not foreshadowed in any of the past proceedings. No acceptable saving clause has yet seen the light. It has been said that nothing of the kind touching the interest of the Gaslight and Coke Company can be added to the South Metropolitan Bill; but this is perhaps an extreme opinion. However, the point is interesting, and of great importance for all the parties concerned.

The Welsbach Company's New Prices, and their Effects.

THE proceedings of the Welsbach Company have been so freely criticized on various counts, that there is a peculiar satisfaction in the recognition that at last the responsible heads of the concern have given the plainest proof of their possession of sound common sense and a true commercial instinct. As announced elsewhere, the Company have made a sweeping reduction in the prices of all their specialities, with the result that these are now within a measurable distance of the rates which have so powerfully contributed to make the incandescent gas-burner the light of progressive Germany. All that will be necessary henceforward, to enable this system of gas lighting to fulfil its destiny, is to maintain, and wherever possible improve, the quality of all the elements and accessories of the system, and to organize the work of popularizing it so that English people may be put in the fullest possession of their new advantages in this regard, with the smallest possible trouble and thought on their part. We would heartily congratulate the Welsbach Company on their wise liberality in thus anticipating the inevitable order of events. Cheap incandescent gas-burners are bound to come, sooner or later; and it would have been fatal to the Welsbach Company to have persisted in an impracticable attitude. It now remains for the British gas industry as a whole to forget old sores, and take up the pressing task of developing the potentialities of the incandescent light as this has not yet been attempted. There is no denying the truth that, for various reasons, our people have not taken very kindly to the incandescent gas-light. This remark applies chiefly to gas technicians as a body. The very worst phase of the obstructive British spirit of dislike to every innovation which calls for a little patience and even less intelligence, was shown in the London County Council's opposition to the Bill of the South Metropolitan Gas Company. There one eminent scientific person after another professed—they were mostly Professors—to hold the incandescent system of gas lighting in small esteem. These exalted partisans of obsolescent gas-burners failed to impress the Committee of Parliament. But they would appear more distinctly "out of the running" than ever, if their testimony had to be taken afresh this week.

All true friends of the gas industry of this country should now set themselves heartily and unreservedly to grasp the bearings of the new position thus inaugurated. We may not all be unreservedly admirers of the incandescent gas-light as we know it; but let us admit that it is actually in possession of the field, and is far and away the most economical artificial light in the world. This being true of it, how weak and foolish it is to hold it at arm's length, either by reason of baseless dislike, or because it requires a little helping on its way to the affections of the public. Does anybody who may read these lines suppose that if it were given to the electricians, or the acetylene people, to be able to claim justly the possession of the cheapest light on earth, they would not push the advantage for all it might be worth? Let gas managers and others therefore take some fresh thought in this regard; and if they have scorned their great advantage in the past, let them mend their ways. Here is a means of gas lighting with which statutory candle power has nothing to do, and which even reduces to utter insignificance such a consideration as the price of gas. Which is likely to be better pleased—the user of a clean gas by means of burners consuming at rates of from 2½ to 4 cubic feet per hour, and getting a lighting effect of from 40 to 80 candle power, or he who is left to pay for 16 to 20 candle gas from which he does not get more than from 6 to 12 candles effect at the same rate of consumption? Those gas companies who shut their eyes to the possibilities of the immediate future of their lighting business, will deserve all the hard things that a censorious public has ever said of their standard of intelligence and business capacity.

We refuse to believe that British gas companies are all officered by Rip van Winkles. They have been justified hitherto in regarding the incandescent gas-light as a luxury with which the well-to-do consumer might be left to provide himself. It has, besides, been passing through its period of probation. This stage, if not quite over, is nearly closed. Like the bicycle, the incandescent gas-light is about as perfect as ordinary working hands can make it. Nothing more was needed to commend it to the good graces of gas technicians than a little concession on the part of the manufacturers under a monopoly of which the end is in sight. The Welsbach Company have turned over a new leaf. Whether or not this has been done in time for themselves, remains to be seen. But at least they have shown once more that it is never too late to mend. Now it is the turn of the gas industry to make a suitable response, to the advantage of the public, of the holders of gas property, and of the trade in the cheapest light upon earth. The change comes at a psychological moment, when gas must be raised in price by reason of the higher cost of coal. What is that to the saving rendered possible by cheap incandescent gas lighting? Gas at 10s. per 1000 cubic feet is, light for light, cheaper to the user of incandescent burners than gas at 2s. 6d. per 1000 cubic feet to the thriftless householder who adheres to his old flat-flame burners. But putting the saving wholly in the comparative smallness of consumption of gas by the ordinary run of incandescent burners, and throwing in the increased lighting effect for nothing—is it conceivable that English people are so much more foolish than the Germans, Dutch, or Swiss, that they will remain blind and deaf to the advantage of adapting themselves to the new fashion? Of course, they need instruction; but the same help that has led them to so extensive a use of gas for cooking and warming, and has popularized the prepayment meter, will make the incandescent light universal—if only the task is undertaken heartily, and with full faith and sympathy. At last the incandescent gas-light is within the reach of the British prepayment meter consumer, as it has long been of his Continental compeer. It is an opening of which no man living can see the end. With 25 cubic feet of gas selling in the cottage for a penny, making the little room like day for ten hours at this cost, the Dark Ages of candles and oil-lamps will be driven away for ever from whole regions of working-class homes.

The Case for a Commission of Inquiry on Coal.

THE extraordinary rise in the price of coal, which is adversely affecting the large majority of the population of the country, has so far received scant attention in the House of Commons; but it may be expected that the subject will before long be brought to the front. The effect of the present long-continued dearness of coal is only just beginning—it has, indeed, not yet begun—to be fully realized, as the large consumers who buy under contract, such as Gas and Railway Companies, have not up to the present had to pay the abnormal prices which they will have to provide for under their new contracts. When the customers of these concerns begin to feel the worst of the pinch, the question is likely to be brought urgently to the notice of Parliament. That the subject has not yet been debated, is, indeed, a matter of accident, as Mr. George Harwood, the member for Bolton, had put down for Tuesday last a motion declaring that it is expedient that a duty be levied on all coal exported from the United Kingdom. But the day named was lost through the early commencement of the Whitsuntide holidays. It is, however, understood that the resolution will be kept upon the paper, together with the amendment that was put down by Mr. D. A. Thomas, the member for Merthyr, to the effect that it would be inexpedient to revive in any form the export duty on coal until a full inquiry has been made into

the coal resources of the United Kingdom, and that such an inquiry should be instituted forthwith. Whatever may be one's views upon the question of imposing a duty on the coal exports of the country, there can be no two opinions as to the wisdom of fully inquiring into all the facts bearing upon the problem, and of obtaining the advice of those best qualified to judge as to the effect upon the nation generally of such a radical change in our fiscal system, before committing ourselves to a policy of taxation or prohibition of exports.

Mr. Thomas, in a letter to a contemporary, puts forward, in favour of appointing a Commission to inquire into the whole question of our coal supplies, arguments which have been more than once used and emphasized in the "JOURNAL" during the past few months. The principal ground for such an inquiry is that what is of real and pressing importance to us as a commercial nation is, not that we should know how many years it will be before the coal resources of the country will approach exhaustion, but that it should be ascertained for how long the best quality and most easily obtained coal will last. It would be of little satisfaction or practical importance to know we have enormous quantities of coal as yet unwrought, if the cost of raising that coal to the surface were such as to fatally handicap us in the severe competition we have to face, and the still more severe competition that may be in store for us, in the markets of the world. The necessity that we should know—in order that we may by that knowledge shape our future commercial policy—for how long we can depend upon supplies of cheap fuel, of itself constitutes a sufficient ground for the appointment of a Commission of experts in mining geology and engineering and of practical business men.

It must, further, be borne in mind that, since the days of the Royal Commission of 1866-71, two factors, then unforeseen, have become of great importance in the coal problem—namely, the tremendous growth of the fuel export trade, and the entering of America into the world's coal market as a producer on a vast scale, and with practically unlimited resources. The Argyll Commission dealt almost entirely with the question of home resources and consumption. It is now necessary that the fuel question should be considered in its world-wide and international aspects. It cannot, however, be denied that, looked at from the side of our own consumption and supply alone, it would be of profit that the latest facts and statistics should be collated and fully considered. We hope that those members who have sought to bring the necessity for the appointment of a Commission or Committee of Inquiry into the whole question of our coal resources before the notice of Parliament, will persevere in their endeavours, and will eventually attain their object. Now that the war is so rapidly approaching a satisfactory termination, the general public and the House of Commons will have more leisure and inclination to consider matters of importance at home.

The Southern District Association—Gas-Mains and Electrolysis.

AT Bristol, on Thursday last, the Southern District Association of Gas Managers were well entertained by their President (Mr. D. Irving), and spent a very pleasant day. It was the first time that the united Association had met so far to the westward; and the result was a highly gratifying increase of the attendance of those members who hail from the more remote regions between the Channel and the Severn Sea. The only technical interest of the meeting centred in the subject of the precautions taken by the Electric Tramways Company to prevent electrolysis of the mains and pipes in roads occupied by their service. This is one of the best of its kind in the kingdom; and when fully developed in accordance with the plans actually in course of execution, the Bristol electric tramways will be a really remarkable undertaking. We are able to give Mr. Irving's statement of the law and practice of this important matter, as they apply to the interest of the Bristol Gas Company. So far, no noticeable injury has been suffered by either gas or water mains, although it is found that a good deal of vagrant current travels along the latter. It is early days to say much on the point. No difficulty has been experienced in keeping the electrical service within the lines laid down by the Board of Trade for the protection of the mains, especially since the return of current by the tramway metals has been helped by one of Professor Elihu Thomson's "boosters," which provides an additional path for the return current. Still, it is impossible for those who are responsible for the preservation of gas and water property to ignore the gravity of an altogether new and additional cause of depreciation of buried pipes, which, if it acts at all, must tend to accelerate the ordinary process of destruction. Whatever may be the real significance of the terms employed to denote electrical quantities—whether a difference of potential between pipe and rail of one volt or of seven volts is of any importance or not—the point is that it is always operating while the line is working, which is for the greater part of the day and night; and it is always tending in one way, and that the course of ordinary decay. The action is constant, and cumulative. It is therefore something to be watched. A hundred years is a long time; but cast-iron mains are credited with this length of working life under favourable conditions. Sixty years is the period allowed to many local authorities for redeeming loans applied in purchasing gas undertakings. What if the mains are going to last only thirty years, or less? There is no reason for taking an unnecessarily alarmist view of the matter; but, at least, it must be reckoned a disturbing element and a breach of the security once enjoyed by all pipes of proper strength comfortably put to bed at a sufficient depth in the ground.

Towards the Solution of the Old-Age Pension Problem.

WHEN the question of a State or rate aided system of Old-Age Pensions for the deserving poor has been under discussion in the columns of the "JOURNAL," we have more than once made it the occasion to remark upon the failure of politicians and social reformers to take into account, or to give adequate consideration to, the fact that the old age of no small number of working people is already provided for by their employers, or by schemes instituted and supported by those employers. The advocate of the State-provided pension generally, to judge by his arguments, begins by assuming that, unless a working man have by his own thrift and providence made provision for the days when he will no longer be able to earn his living, that man will either be a burden to his relations or go straight to the workhouse. The practical man with some acquaintance with actual facts know that, so far from this being the case, no inconsiderable number of workpeople are in the service of employers who believe, and have good reason to believe, that the prospect of a reasonable pension when past work attracts to their service, and retains as faithful servants therein, the better class of workmen. Some employers undertake the entire burden of providing for the old age of their hands. For instance, as Colonel Makins last year informed the Powers of Charge Committee, the Chartered Company (who cannot employ fewer than 12,000 to 14,000 men) pension their aged servants under a regular scale. Other employers subscribe to the Provident Institutions of which their men are members, and which include superannuation among their other benefits. It would be most interesting, and would be surprising and instructive to the aforesaid social reformers, if statistics could be obtained showing the percentage of the workmen of this country whose maintenance in old age is so guaranteed.

The subject is recalled to mind by the report of the first granting of pensions (to the number of 100) to members of the South Wales Miners' Provident Fund—an occasion which elicited from Sir William Thomas Lewis, who is by no means a sentimentalist or visionary, the remark that "the dream of his life was realized." This fund (to which the men contribute 3d. and the masters 5d. per week) only applies to a limited number of men in a restricted area; but Sir William Lewis sees in its new application—as we see in it and in other schemes similar to or resembling the Welsh Miners' Society—an indication of the possible solution, by different methods, of the problem which it has been sought to solve by legislation. He further believes it to be "only a beginning of the benefits which will ultimately result from a combined effort on the part of employers and employed." It is, indeed, most satisfactory to observe the tendency towards the settlement of a question which, so far as legislation thereon is concerned, becomes more difficult the more closely it is examined. Sir Michael Hicks-Beach said the other day that, so far, every scheme he had seen since the report of Lord Rothschild's Committee was, to his mind, open to two great objections. It would impose an intolerable burden on tax or rate payers, and it would do more harm than good to the poor. As the Government have

also intimated—what is obvious—that the present is not a time for undertaking any schemes involving the expenditure of large sums of money, it is highly probable that, before any scheme for settling the question is adopted by Parliament, this question will, to a very large extent, have been disposed of by those who have no ulterior motives beyond the betterment of the working classes, and the improvement of the relations between employers and employed. Every sign of a settlement by such means is very welcome, and especially so when, as in the particular case before us, the plan forms part and parcel of a comprehensive scheme for providing compensation for accidental injuries, in lieu of the provisions of the Workmen's Compensation Act. We have always held that the two questions of old-age and accident insurance might well be dealt with in a mutual scheme under the Act.

WATER AND SANITARY AFFAIRS.

THE London County Council could not separate for the Whitsuntide holidays without having another debate on the London Water Question. They are nervously anxious in regard to the present position of affairs. Their Bills have been rejected, and no intimation has been given by the Government of any intention to deal next session with the subject of the water supply of the Metropolis. Consequently, Londoners are left to the tender mercies of the Water Companies. This, in the eyes of the Progressives on the Council, is a bad position; but there is something far more serious behind. The Staines Reservoirs Act of 1896 contains the now familiar "sterilization" clause, which provides that, in the event of the undertaking of any of the three Companies concerned in that scheme being purchased, otherwise than by agreement, within seven years, no claim is to be made in respect of any advantages accruing from the passing of the Act. The operation of this clause will cease in this particular instance in 1903, and in other cases two and five years later. The limit, therefore, is 1908. As the Council do not see the prospect of purchase being effected by the earliest date mentioned above, they are desirous of promoting a Bill next session to extend the operation of the clause till the latest one.

Objection was raised by members of the Moderate party to the initiation of more legislation by the Council, and suggestions were thrown out that an endeavour should be made to ascertain the intentions of the Government, who, it was thought, ought to take the next step in the direction of settling what seems to be an almost interminable question. But if this step was to be towards legislation on the lines of the report of the last Royal Commission—and on what other lines could it proceed?—then Mr. M'Kinnon Wood, the successor to Mr. Dickinson as Chairman of the Water Committee, objected to it. Of course, the Council do not like the proposed Water Trust, and they regard the recommendation to constitute such a body as part of the attack now being made upon municipal enterprise. Mr. Wood strongly supported the Council's policy, believing that in so doing he was defending the true principles of municipal government. In the result, the Committee obtained the necessary sanction to promote their Bill; and subsequently the Standing Orders were suspended to allow of recommendations on the subject of applications to Parliament next session on the water question being submitted to the Council up to the limit of time allowed for giving the necessary "Gazette" notices. There is a prospect, therefore, of seeing the Council in Parliament again next year, incurring more expense, but with what result we will not venture to predict. In the words of the Chairman of a Select Committee, uttered on a recent occasion: "Next year's Parliament must decide its own legislation."

Now that there is a possibility of the Thames being drawn on to a larger extent than at present to furnish the Metropolis with an adequate supply of water, it is satisfactory to learn, from the recently issued annual report of the Conservators of the river, that during the past year they continued their efforts to carry into effect the largely extended powers conferred upon them by their Act of 1894 for the prevention of the pollution of the main stream and its various tributaries. During last year, the pollution from 17 towns and villages, representing a population of upwards of 36,000, was diverted from the tributaries; and pressure was brought to bear upon the Local Authorities of places where works have not yet been carried out to prevent pollution. Legal proceedings were instituted in fourteen cases for non-compliance with the provisions of the Act, and four convictions obtained. Of the rest, three were adjourned and seven withdrawn on undertakings being given by the offending parties. Some reference is made to the drought in the summer and autumn months of the past year. Up to May, there was plenty of water in the river; but in June the quantity began to fall off. From July to September, the average flow over Teddington Weir was very much below 200 million gallons a day. But in October it improved; and in November it was 927 millions. The construction of a new weir and flood channel at Penton Hook has been commenced; and, in connection therewith, provision will be made for measuring the flow of the river at that point, as provided by the Staines Reservoirs Act of 1896. The Conservators derive a by no means insignificant income from the Water Companies; the accounts accompanying the report showing that last year they were paid £2450 in respect of the lower, and £22,204 on account of the upper navigation. Of the sum paid in 1898, a balance of £2756 was brought forward. As the total revenue for the upper navigation was only £32,132, it will be seen that the Companies contributed a very large proportion of it.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1511.)

BUSINESS on the Stock Exchange last week was decidedly better; and it seemed to improve cautiously step by step. Of course, the war was the chief factor, though there were others, too, which could by no means be disregarded. At first the tendency was somewhat sensitive uneasiness lest our approach near Johannesburg should be the signal for wanton destruction of property. Then, this apprehension allayed, everything was bright on the expectation of an immediate occupation of Pretoria. Then, again, hope was deferred; and affairs in France and China became disquieting. But the good feeling always seemed to outweigh the other; and the markets became buoyant, and seemed to really encourage each other. There was also a fairer appearance of the public coming in. So prices generally are the better all round. The Money Market increased in ease; and there was a fairly wide expectation that the Bank rate might be lowered again on Thursday; but it was not destined to be. The Gas Market underwent a remarkable change. We noted last week that there was something like a turn of the tide looming ahead; and the turn has come. Business was not very active, and, indeed, it was decidedly less so than in the week before. This, however, was only natural towards the close of an account, with the Whitsuntide break following upon it. But whereas for some weeks quotations had been steadily falling, last week it is to be noted that, without exception, all changes of quotation are in the upward direction. Gaslight ordinary led the way with a rapid advance from 95 to 102, no doubt for some sufficient reason, though it may not be easily discerned. Attention was so concentrated on the ordinary, that the secured issues quite escaped notice. South Metropolitan were in favour, and had a moderate advance in price. Commercials were again quite stagnant; stock being apparently very scarce in the market. There was hardly any business done in the Suburban and Provincial group; and quotations stood unchanged. The Continental Companies participated in the general cheerfulness; and all three of them, Imperial, Union, and European, had a rise. Several of the undertakings in the remoter parts of the world had a moderate advance; Buenos Ayres, River Plate, Melbourne, and Hong Kong being the gainers. Business in the Water Companies was only moderate; but there, too, a better tendency was apparent.

Changes in quotation were few in number and slight in degree; but all were in the upward direction.

ELECTRIC LIGHTING MEMORANDA.

The Electrical Power Bills—Speculation Deprecated—Necessity for Attending to Details—Where Professors Disagree—A Study in Electric Lamp Posts.

THE Committee of the House of Commons who have had under their consideration the grouped electric power supply Bills have made the announcement that they approve generally of the idea of enterprises of this kind, and think that facilities should be afforded them in the public interest. This is of the nature of a general declaration in favour of the preambles of all the Bills, and is meant to warn promoters and opponents of the particular measures still awaiting the attention of the Committee, to confine themselves to the particular merits of the case. Our contemporary the "Electrical Review" naturally welcomes this declaration of the mind of the Committee with enthusiasm, and remarks that howsoever it may disappoint the

many opponents of the measures relating to the supply of electricity (in bulk) which are now before Parliament, it must be hailed with satisfaction by the electrical world. The journal goes on to anticipate how, "armed with the necessary parliamentary authority, vast companies can be floated to supply a cheap and economical source of power over large areas. By this means, industries may be promoted in districts where hitherto, owing to the absence of water or other motive power, or the difficulty of obtaining coal, no industrial progress has been made." It might have been thought that wise and experienced well-wishers to electrical enterprise would shy at the very thought of a possible recrudescence of the "vast company flotation" nuisance in this connection. About the very worst thing that could possibly happen to the electrical industries and interests of this country would be this same revival of electrical speculation, such as flourished twenty years ago.

It is particularly vain to talk of big company flotations for the supply of electricity in bulk, inasmuch as this is one of the particular dangers of which Sir James Kitson's Committee have been warned, and which Parliament will certainly spare no pains to disperse. It is one thing for the Committee to approve generally of the idea common to all the present year's crop of electrical power Bills; but it will probably prove to be quite another thing that will determine their approval or otherwise of particular schemes. Supreme rights over large areas for supplying electrical power either in bulk or by retail will not be granted to every applicant of the "carpet-bagger" kind. Respectable local interest will certainly be regarded as essential to the successful promotion of any such venture. There is no British coal field so remote from all native care that any party of speculators hailing from Westminster or Old Broad Street have only to deposit a Bill for exploiting it in this way to command the assent of Parliament. Quite the contrary. Parliament is in no mind to let local authorities who do or do not happen to have already gone into the business of electric lighting, play the part of dog-in-the manger to duly accredited electrical supply companies; but the mere "foreign mercenary" will receive no favour. This is as it should be. The company-monger and the electrical schemer must be kept under if the new movement is to have any success at all. In the hands of good men of business, who know the kind of service they want, and can employ the right people to do their work, electricity generation and distribution on the large scale may possibly flourish in British manufacturing regions better even than it does at Niagara, in which example it is not possible to repose unquestioning belief.

Only—and this is the chief consideration—all permanent success will be attained gradually, and strictly as the fruit of experiment and attention to local requirements. The industrial world knows all about the "principle," and does not care a pin for eloquent generalities about pit-head electricity generation, such as pad the pages of popular magazines. Men in business want to know which is the best and cheapest way of working a particular pump, or punching machine, or drill. They are quite cold to abstract disquisitions on the advantages of electrical pumping, or whatever it is. They only care for the driving of their own pump. This is the cue for the electricity seller. Mr. Swinburne has given it to him, some time ago, in his sarcastic description of the stupid and wasteful style in which British works managers are yet content to carry dripping steam pipes all over the yard to supply isolated machines; and it is futile at present to talk about the new electrical departure as competent to create industries in districts where there is nothing of the kind now. The creation of an industrial population is a slow business, to which go many elements other than that of the supply of cheap and easily distributed motive power. That may come, of course, with time; but the immediate need is to carry the power where it is actually wanted. We mention this tolerably obvious consideration, because the hypothetical discussion of remote possibilities in connection with any matter of engineering is to be avoided by everybody who wishes to convey the impression that he means business "here and now."

It is well understood of gas engineers that they cannot, as a class, pretend to any special knowledge of the science of electricity. They admit the existence of such a science, and look up with respect, bordering upon awe, to the clever people who are able to work sums in the measures proper to it. It is only a few of the very sceptical among the various classifications of engineers who are no electricians, who can be heard to express a doubt as to whether the electricians really know all that they seem to about their own technic—just as Darwin did not believe that all Germans knew their own language. This scepticism is too shocking. Yet in the current number of the "Electrician" there is something which at the first glance seems to justify a little of it. Not long ago, Professor George Forbes, who is understood to have been the harnesser of Niagara, read a paper on the long distance transmission of power by electricity. Now Professor Perry writes to say that he "thought the paper a practical joke." The correspondence is worth reading; but it occurs to one to ask in what other branch of science could a paper by one leading light be similarly stigmatized by another?

Mention has been made in our "Editorial Notes" of the hideous electric arc lamp standards with which the Vestry of St. Martin's have disfigured the neighbourhood of Charing Cross. There is notoriously no accounting for tastes; and recently these particular standards, which were denounced by a correspondent of "The Times" as being of "an atrociously debased and vulgar character," were specially illustrated in the "Municipal Journal" as being "the most artistic lamp possible" for the Vestry to obtain. It is stated that the Vestry took the unusual course of inviting tenders for designs, and "about fifty of the leading electrical engineering firms entered into the competition," which, of course, amply accounts for the result. Fancy asking a "firm of electrical engineers" to design a street lamp post! It is carefully set down that the Vestry made a point of having designs unlike anything that could be seen elsewhere; and the approved patterns have been duly registered as their property. There is not likely to be a strong rush of applicants for permission to reproduce the design.

THE PARIS INTERNATIONAL EXHIBITION.

The Side-Shows—The City's Attractions.

One would have supposed that an Exhibition which contained 121 classes would have furnished sufficient attractions to the visitor to render unnecessary the introduction of anything extraneous. That the organizers of the monster display now being made in Paris were not of this opinion is evidenced by the fact that they have admitted a goodly number of side-shows which serve as diversions from the more serious business of examining the exhibits, and furnish amusement, and in some cases instruction, after the galleries of the Exhibition are closed. And in so doing it must be acknowledged that they have only followed the lead of others who, in recent times, have projected undertakings of a similar character, though necessarily on a much smaller scale. There has been no exhibition of late years without its "extras." As far as the one in Paris is concerned, those of our readers who accompanied us in the rapid walk we took through the Exhibition last week will have obtained some idea of their nature and location; but we may mention again that they will be found on the quays on both sides of the Seine, in the gardens of the Trocadéro, and on the Champ de Mars. A few particulars concerning them may be of interest by way of supplement to what has already appeared.

Taking first the Champ de Mars, the object which, after the lighting, will probably first attract the attention of visitors connected with the gas industry, is the Optical Palace—a conspicuous building to the west of the Eiffel Tower. Evening is the best time for a visit. The admission is 1 fr. 50 c., and the advertisement promises sixty different attractions for this comparatively small sum. But probably one-third of them will suffice. The great feature, in more senses than one, is the gigantic telescope, nearly 200 feet long and 5 feet in diameter. The tube is made of sheet steel in 24 sections bolted together. Only Jules Verne and his readers have succeeded in reaching the moon from the earth; but M. Gautier, of the Bureau des Longitudes, the constructor of the telescope, has succeeded in bringing our silver satellite down to us so that we can see pretty well what she is like. As she will be full on the 13th, probably some members of the Gas Institute party will take the opportunity of making her acquaintance. The catch phrase of the Optical Palace is: "*La Lune à un Mètre!*" This is perhaps a pardonable exaggeration; but, at all events, this luminary is brought to within about 44 miles. The telescope is supported by five stonework and iron pillars rising from the large hall in which it stands, and at its extremities by the floors of the galleries. Its axis is 23 feet above the ground. The difficulty of pointing this monster to the sky presented itself to the constructor; and he solved it by simply not pointing it at all. As a matter of fact, the object to be looked at is reflected in a large Foucault mirror, moved by clockwork, and thence through the telescope, on to a plate of glass at the far end. The glasses used are crown and flint—the former weighing 500 lbs., the latter 800 lbs.; and they are valued at somewhere about £28,000. Their magnifying power is upwards of 8000 diameters; whereas the highest powers hitherto obtained have not exceeded 3500 diameters. Some interesting photographs of the moon are shown in one of the halls. An instructive feature of the palace is the series of twenty glass cases in which an attempt has been made to represent the various stages in the formation of the earth. There is a Pasteur room, and also one in which luminous microbes make a feeble attempt to displace incandescent gaslight. The other attractions of the palace are of a varied character, and need not be particularized. The lighting is by electricity supplied from the cables serving the left bank of the Seine. The one leading to the building is 3¼ inches in diameter; and about 12 miles of wire convey the current—3000 ampères, continuous and alternating—over the edifice. The alternating current is obtained by 22 transformers; the smallest giving out 400,000 volts, the largest 1,200,000 volts. They furnish altogether 13,000,000 volts. In addition to the numerous arc lamps required for the lantern views, the current serves 14,000 incandescent lamps of 16 and 32 candle power. Before leaving the palace, notice should be taken of the decorations in the Foucault Gallery.

The other attractions in the neighbourhood of the Eiffel Tower do not call for more than brief notice. At the back of the Optical Palace are Venice in Paris—the ancient city of the Doges transferred to the French capital; the Transatlantic Panorama, by which the visitor is transported to Algiers; and the Celestial Globe, a sphere about 400 feet in circumference, elaborately decorated with certain mythological figures representing the

constellations. On the other side of the Tower is the Luminous Palace, constructed entirely of glass, and illuminated by 12,000 incandescent electric lamps. Two broad flights of steps lead to a large hall in which articles of jewellery are on sale. Underneath are some glass blowers at work. Near it are the Costume Palace (showing the changes which have taken place in costume throughout the ages) and the panorama of a voyage round the world, with animated figures.

At the south-west corner of the Champ de Mars, and not far from the Machinery Section, will be found a deservedly popular attraction of the Exhibition—the Swiss Village. It consists of a really creditable representation of Swiss scenery—mountains, pine forests, cascade, lakes, châlets, &c. All the characteristics of village life are reproduced here. Features of historical interest are the Clock Tower at Berne and the houses in which Rousseau and Madame Rachel were born and Napoleon took lunch when crossing the St. Gothard.

In the gardens of the Trocadéro, the most picturesque features are the Algiers Street, and the Tunis and other Courts. The street is part of the Exhibition; but payment is necessary if the visitor desires to witness the gyratory or saltatory performances of the denizens, the sonorous clang of whose instruments of music (?) is heard all too plainly outside. Not far from this spot is an interesting show called Andalusia in the Time of the Moors, in which an endeavour has been made to reproduce the principal monuments of Spain at that period, including the celebrated Tower of Giralda in Seville, which was seriously damaged by an earthquake in 1884. The neighbourhood of the Trocadéro should not be left without a visit to the underground mineral workings (*le monde souterrain*) which have been constructed in the catacombs beneath the gardens. Here a tolerably good idea may be obtained of a mine and of the kind of operations which are carried on there. The entrances are on either side of the cascade. While here, the adjacent building (not an "extra"), containing the Russian and Siberian exhibits, including that of Nobel Bros., may be inspected, if this has not already been done.

There is nothing more in the way of attractions until we reach Old Paris, which was incidentally mentioned last week. It deserves, however, more attention than we were then able to bestow upon it. Visitors who are conversant with the events of the middle period of French history—whether through the medium of the school-book or the more agreeable one of the romance—will find much to interest them in strolling through this section of the Exhibition. Coming from the Trocadéro, we have approached it from the wrong end, and must therefore transport ourselves to the entrance near the Pont de l'Alma.* The visitor enters by the Port St. Michel and reaches the Pré aux Clercs, with the Rue des Vieilles Ecoles in front of him and the Rue des Remparts on his right. It was in the Pré aux Clercs that the army of Henry IV. was encamped when he was besieging Paris in 1589; and it was the scene of many a duel. The Maison aux Piliers is specially interesting from the fact that it was the first Hôtel de Ville which Paris possessed; having been purchased for the purpose by Etienne Marcel, Mayor of Paris, in 1357. In the Rue des Vieilles Ecoles, with its curious shops and fantastic signboards, stands the house in which Molière was born; and near it the Maison du Grand Coq—the cradle of the French Press—in which Renaudot, the doctor-journalist, started the "Gazette de France." This was also, and necessarily, the quarter in which the printers and booksellers of the time carried on business. The Rue des Remparts ends in a building in which will be found the "Pomme de Pin"—a music hall of the Middle Ages. A little farther on, at the foot of the staircase leading to the theatre, stands the pillory of the abbey of St. Germain des Prés, founded in the sixth century. We next come upon the church of St. Julien des Ménétriers—a building which dates from the thirteenth century. Up to the time of the Revolution it was the property of the Corporation of Jugglers and Fiddlers. Leaving the church, the back of the square is occupied by the markets, after which begins the Châtelet quarter, with the Pont au Change. This curious bridge of houses, which was built between 1599 and 1609, was burnt down in 1621, but was rebuilt in 1639 and again in 1858-9. The sixteenth and seventeenth centuries dominate the Pont au Change; but in the Rue de la Foire St. Laurent we come right into the eighteenth. Here, however, we have the ancient palace of St. Louis, Philippe le Bel, Charles VI., and Louis XII. In taking leave of Old Paris (a very good view of which may be obtained from one of the river steamers), we must congratulate the architect—M. Robida—upon the skill which he has brought to bear in carrying out this interesting historical reproduction.

Quitting the old, we come almost at once upon the new. In the Rue de Paris are to be found the lighter attractions—the "frivolities"—of the Exhibition; and, as we remarked last week, they may be taken or left as the visitor pleases. The writer is of those who think that the *dictum* of Horace—"*Dulce est desipere in loco*"—pronounced two thousand years ago, holds good to-day. It is pleasant to indulge in a little frivolity at the proper time and in the right place. And what more convenient season than a holiday, or better place than Paris? We will therefore briefly enumerate the principal features of this Paris street: The Dancing Palace, in which the dances of all nations may be seen; the Palace of Humour, containing a collection of drawings, sculptures, lantern exhibitions, &c.; the *tableaux vivants;* the inverted tower; the marionettes; and the concert-room.

The foregoing are the principal extraneous attractions of this wonderful Exhibition. Let us now look for a moment at those of the city in which it is located. Of course, the chief, to anyone connected with the lighting industry, is the extraordinary quantity of illuminant used. If we English are a nation of shopkeepers, our friends across the Channel may almost be called a nation of *restaurateurs*. Restaurants abound, and they must be well lighted; and so must the shops. "Paris by gaslight" was at one time, and probably still is, an item in the programme of the tourist managers; and the drive through the brilliantly lighted city was not by any means the least interesting of their "trips," even to an ordinary visitor. How much more so will it be to a gas engineer. The high price of gas in Paris, as we have several times pointed out in the "JOURNAL," does not militate against its very liberal use. Twenty years ago Paris was considered to be very well lighted; but soon after Jablochkoff made the great discovery which led to the introduction of arc electric lighting, the Gas Company showed what they could do in the way of improved illumination by gas. Ten years later, the incandescent gas system began to make a little headway; and now the Company have taken it up, and have shown to the world, on the Champ de Mars, the Place de la Concorde, and in many of the principal thoroughfares, what are its capabilities. Let the visitor place himself in front of the Opera House, and in the three principal streets before him—the Avenue de l'Opéra, the Rue de la Paix, and the Rue du Quatre Septembre—he will see how streets can be lighted by gas and by electricity. Should a performance be going on, a glimpse at the interior of the house will be a revelation.

As the city is light by night, so, as a general rule, is it bright by day. It is this brightness which imparts to it its irresistible charm for those who usually live under more sombre skies—which gives to its citizens the gaiety which is characteristic of them. Paris, as all the world knows, has passed through very troublous times; and yet to-day their effect is scarcely visible. A few years ago, the ruins of the Cour des Comptes bore witness to the ravages of her foes from without as well as of those of her own household; but these have been removed. The Strasburg statue on the Place de la Concorde, however, still testifies to the fact that certain events have not yet been obliterated from the memory. Mr. Augustus J. C. Hare, in the Introduction to his two charming volumes on Paris, of which a second edition has just been published, says very truly that "it seems as if the great object of French men and women in every class were to make life as easy and pleasant as possible—to ignore its present and to forget its past troubles as much as they can." Voltaire pitied a Frenchman who allowed himself to be conquered by depression—

"Que je plains un françois quand il est sans gaieté!"

Pleasure in Paris becomes a business. There are many diversions and distractions in the city—some specially provided, it would seem, for the delectation of English, American, and other visitors; for it is stated that the Parisians themselves do not patronize them. But in the writer's opinion one of the most enjoyable is to be found, as Mr. Hare points out, in the half hour spent upon the Boulevards, in the Tuileries Gardens, or in the Champs Elysées, on a fine afternoon, watching the stream of human life passing on. The *flâneur*, the *petit rentier*, the *homme d'affaires*, the *grande dame*, the *demi-mondaine*, the *jeune personne* on her way from business—all these may be seen while taking a modest *bock* or a *café noir* (with or without the *petit verre*) upon the Boulevards; and it is this constantly changing outdoor life which constitutes, as we have said, the irresistible charm of the White City.

As some of the members of the Gas Institute who will shortly visit Paris will possibly do so for the first time, it may be permissible to offer two pieces of advice—viz., to avoid touts in the streets, and keep a sharp eye on coins taken as change, as both may lead to the saving of money. French silver coins anterior to 1863, except 5 fr. pieces, are not current; nor are Papal coins and the 50 c. and 1 and 2 lire coins of Italy, or the silver coins of Switzerland bearing the figure of Helvetia in a sitting position, with the exception of the 5 fr. piece. With these words of caution, we may leave Paris and its Great International Exhibition (which was visited on Sunday, the 27th ult., by no fewer than 364,000 paying people) to those who, we trust, are for a short period about to enjoy both.

* It may be mentioned that the usual charge for admission (1 fr. by day and 2 frs. at night) is doubled on Fridays and halved on Sundays.

The Papers at the Gas Congress in Paris.—The President of the Organizing Committee of this congress (M. Th. Vautier) has issued a circular on the subject of the copies of the reports of the proceedings, &c. The reports will be sent, after the congress, to all who are present, as well as to the subscribers. But, in order to facilitate discussion, it is intended, where the MS. has been received in time, to distribute prints of the papers several days in advance. As this will entail considerable expense—there being about 1100 supporters of the congress—the Committee have decided to charge for these advance proofs in cases where the recipients do not, after having obtained them, attend the meeting. The price will be 10 frs. Forms of application for these prints accompany the circular, and it is requested that they may be returned before the 25th inst. to M. Vautier, No. 65, Rue de Provence, Paris.

SOME FEATURES OF THE OPPOSITION TO THE SOUTH METROPOLITAN BILL.

In the course of the remarkable proceedings of the House of Commons Committee on the South Metropolitan Gas Company's Bill, for enabling the Company to rid themselves and their customers of the superstition of enrichment of the supply, many striking things came out in the opposing expert evidence which go to discredit the modern suggestion that professors and doctors of science would be better guides of the national industries and manufactures than the engineers and business men who usually manage these undertakings. The need for the higher scientific training of those who must occupy the leading positions of industrial organizations is one of the commonplaces of the newspaper and the platform. It is doubtless a justifiable contention, on the broadest grounds; but it is very certain that few well-wishers to the gas industry of the United Kingdom, at any rate, will see much support for it in the character of the testimony offered on the side of the London County Council before Mr. Oldroyd's Committee. Here all the breadth of view, readiness to conform to the most advanced technic, and appreciation of the economic facts of the actual and prospective relation of town's gas to the requirements of the people, were on one side; on the other was a mass of photometrical pedantry and of blindness to everything outside the laboratory, which no common-sense tribunal could for a moment feel itself bound to respect.

We have already commented in the "JOURNAL" upon the South Metropolitan Company's main proposal, and upon the justification offered for it, and have explained that the whole of the benefit of supplying natural, unadulterated coal gas was by the scheme of the Bill to be given to the public. It would have been pardonable to imagine that, under these conditions, there could be no opposition to the proposal on its merits. In the wisdom of the Progressive London County Council, however, all departure, even the best intentioned, from legalized use and wont was to be opposed. The opposition moreover undertook to prove that the change of statutory illuminating power of the South Metropolitan gas from 16 candles—which in promoting the Portable Photometer Bill they said the consumer did not get—to 14 candles, which they also said is about what most consumers have been in the habit of receiving, would greatly increase the gas bills. This contention was based upon nothing but laboratory experiments avowedly conducted *ad hoc*, and interpreted with misapplied ingenuity to establish conclusions which were invariably beside the mark. Mr. W. J. Dibdin began it. He is a photometrist and nothing more, in this connection. He posed the premiss that, with so-called 16-candle gas, an ordinary consumer obtains from his favourite Bray's No. 4 burner, a certain amount of light, which he (the photometrist) calls 100. Then, if the photometer shows the gas supplied to this hypothetical individual to be no more than 15·2 candles illuminating power, he straightway turns up his light until he gets the same amount of light as before—result, an increased consumption of 35 per cent.! Again, when the photometrical value of the gas falls to 14·2 candles, the miserable sufferer with the Bray burner has to flare away 80 per cent. more gas to satisfy his nice craving for the same intrinsic brilliancy of effect. It is prodigious; but the Committee were cold to the line of reasoning started from such a visionary point.

Dr. Clowes followed Mr. Dibdin, with some excursions into new ground which will be discussed presently. Dr. Percy F. Frankland was also in Mr. Dibdin's train; but he could add little fresh proof, as to the injury the consumer would suffer, beyond his general opinion. Dr. Hehner declared that, in order to obtain the same amount of light from a common flat-flame burner with 14 as with 16 candle gas, a far greater amount of gas would have to be burnt than would be compensated for at the rate of a penny a candle. Mr. Isaac Carr appraised the injury to the consumer at 9d. per candle; Mr. C. R. Bellamy said the London gas consumer would lose in illuminating power 27 per cent.; and Mr. T. Fairley said that the increase of consumption would be about 15 per cent. per candle. Not one single shred of proof, based upon actual cash payments or bulk of gas distributed, was brought in support of these *ad captandum* assertions. Why, if Mr. Fairley is right, any gas undertaking in the United Kingdom not tied to a particular illuminating power, or actually trying to supply (with more or less regularity) gas of an illuminating power above its legal standard, can get a 15 per cent. increase of rental any year by the simple expedient of dropping the illuminating power by a single candle! Has it ever been done?

According to Mr. Dibdin, consumers of 14-candle gas ought to pay gas bills 80 per cent. larger (in gas consumed) than those supplied with 16-candle gas. Do they? Mr. Bellamy thinks the 14-candle victims are damnified by 27 per cent. Mr. Carr says 9d. per candle. How is it that the sufferers by the Wandsworth and Putney, the Brentford, the Crystal Palace District, and other Suburban Gas Companies who sell 14-candle gas on one side of many a street, while a London Gas Company serves the other side, have never discovered their loss? One case of the kind would have had more effect with the very matter-of-fact Committee which had to deal with the Bill than all this presumption unsupported by a tittle of fact. Unhappily for all this farrago of theory, there was evidence before the Committee to show that, where the convention of high candle power for gas has been abandoned, the public have not suffered. Nobody was called to prove that the ex-consumers of cannel gas in the West-end of London burnt a cubic foot more of the 16-candle gas which was substituted for it. All technicians remember the uproar that arose when the Glasgow gas was to be dropped from 25 to 20 candles, and the absolute quiescence with which the change was effected. The London County Council did not call a witness from Glasgow. Why was nothing said of the shrinkage of consumption that, according to Mr. Dibdin's theory, should have ensued, but did not, upon the extension of the supply of 16-candle gas by the South Metropolitan Company over the old 14-candle districts of the Phœnix, the Surrey Consumers, and the Woolwich Gas Companies?

So much for the technical question which the London County Council's string of experts sought to answer with reference solely to the performance of admittedly the least efficient kind of burner—the common flat-flame, by means of which the careless and extravagant householder is still often content to burn his gas with a lightning efficiency of about a candle per cubic foot per hour. Against the suggestion that the question did not wholly depend on the presumed everlastingness of this British carelessness and extravagance—that the consumer has it in his power to get twenty to thirty times more duty out of his gas if he chooses—Dr. Hehner and others declared that it would take many years to popularize incandescent gas lighting in England, as it is popular in Germany. It was asserted that such lighting could not be cheap until certain patents expire. Well, witnesses for the Company demurred to the insinuation that English gas consumers are natural born fools as compared with the Continental populace, while agreeing that the spread of incandescent gas lighting has been restricted in this country for sufficiently notorious reasons. It is with the greater pleasure, therefore, that we learnt during the past week that the Welsbach Company have been as good as their word—mentioned in the course of the Committee proceedings—and will henceforward sell their mantles and burners upon something like a commercial scale of prices. If this eminently wise decision of the new Welsbach management is backed up by adequate enterprise in arranging for the maintenance of incandescent lights at anything approaching the open rates prevailing on the Continent, it will speedily be seen who in the recent inquiry was making for enlightenment, and who was working to perpetuate obscurity.

In conclusion, we have to say that if there is one thing more blameworthy in a man of science than shutting his eyes to the light of the best thought and practice in his own line, it is going outside his proper province to give the weight of his name and position to utterly extraneous objections to whatever proposals he may be engaged to oppose as an expert. In these proceedings one is sorry to find Dr. Clowes forgetting the sage maxim, *ne sutor ultra crepidam*, and talking about the existence of danger to the public interest in the profit-sharing arrangements of the South Metropolitan Gas Company. This farcical suggestion should at least not have emanated from a Chemist and Superintending Gas Examiner. It might have been a natural remark in the mouth of Mr. John Burns, perhaps; but coming as it did from a Scientific Adviser of the London County Council, it created a very bad impression. It was left for Dr. Clowes also to be in the sole company of Mr. Isaac Carr in imputing that a "purposely and intentionally vitiated gas is diverted to some other channel, and does not go to the testing-station." This was how the Chairman put the point to Dr. Clowes. To Mr. Carr, the Chairman mentioned the word "fraud," without any extenuation; and so it stands in the official notes and in our special report. Neither witness appeared to be able to avoid the issue thus presented.

Not to dwell upon these incidental and gratuitous unpleasantnesses, which those whom it was sought to prejudice thereby will be the first to forgive, it must be the general judgment that the attempt to set up mere photometry as master of the gas industry was well repelled. It is doubtless of use, in a way and to a degree, to have these definitions of candle power of gas for statutory purposes; but the idea of illuminating power must not in the practical mind be dissevered from the conditions under which it is ascertained, and from the sense in which any such measurement is properly to be understood. Persons too much given to photometry get a habit of speaking of 16-candle gas as if this or any standard of illuminating power existed outside the photometer room. It does not. It is a concomitant of many things. Nobody outside a proper testing-room ever saw a 16-candle gas-flame, except by accident. What is called the legal 16-candle gas-flame, obtained by the use of the standardized burner, is a creature of the conditions. Nobody would produce it for any other purpose than that of testing. It never was a commercial or a practically useful flame, even for an argand; and argands were not for the multitude. All that the County Council experts had to say against the incandescent gas-burner, and more, could be alleged to the disadvantage of the argand burner, without which, photometrically speaking, there is neither 14 nor 16 candle gas. Why, then, all the pother? Simply because public authorities, not actually in business, are apt to be led by officials, who are not men of business either, and whose whole life and training tends to focus their attention on rules and regulations, means and instruments, procedure and penalties, and who outside their office doors, are not in the great movement of the living world of trade and manufacture.

THE MATERIAL PROGRESS OF THE WORKING-CLASSES.

THE very considerable betterment in the circumstances of the working-classes in recent years has been patent to the most superficial observer of social history, and is the source of much satisfaction to those who hold that the welfare of the nation ultimately depends upon the prosperity and contentment of all classes. There is, of course, always to be remembered the fact that prosperity is not necessary to contentment, nor contentment necessarily the outcome of prosperity. But those are considerations the truth of which is more clearly recognized by the wealthy than by the indigent. It is also undoubtedly true that while riches cannot, of themselves alone, procure happiness, they can—in the case of the majority of human beings—largely conduce thereto; while poverty is (except in the true philosopher a rare, if not an extinct, species) of itself a hindrance to happiness and, not infrequently, a source of great misery and of social unrest. Our present business is not, however, to discuss in the abstract the true value of wealth as a factor in human happiness, but—leaving anyone who may so choose to make his own estimate of the influence of better conditions of life upon the character and true well-being of the working-classes—to consider the data available for estimating the extent to which the circumstances of those classes have improved in the near past. A mine of interesting figures bearing upon this subject is to be found in a paper on "Working-Class Progress since 1860," read some while since before the Royal Statistical Society by Mr. G. H. Wood, and reproduced, with a report of the subsequent discussion thereon, in a recent issue of the Society's "Journal."

In order to determine the relative prosperity of a wage earner in different years, it is necessary to ascertain, not merely the actual weekly earnings in each of those years, but, also, the purchasing power of money during the same periods, and, further, the extent to which earnings were affected by regularity or want of employment. To the first and third of these considerations Mr. Wood especially applied himself, and his paper contains a large bulk of carefully digested statistics relating thereto. The final results are displayed in a very interesting chart, whereon five curves are drawn, showing (for the period of from 1860 to 1896) the movements in wages, the consumption of food and other commodities per head, and the state of the labour market as regards the percentage of unemployed, as well as the variations in the marriage and pauper rates. The wages curve is drawn in accordance with a calculated yearly index number, and the consumption of commodities curve in accordance with an elaborate system of what are known to the statistician as "weighted averages."

Two points immediately strike one upon glancing at the chart—namely, the improvement in the wage earnings of the working-classes since 1860, and the tremendous and almost continuous increase in the consumption of commodities such as food, clothes, beer and wines, &c., during that period. All the curves also move, in sympathy, with strange exactness. As Mr. Wood observes, "the interdependence of social movements could scarcely be better illustrated." The puzzle is to determine which, if any, of the curves represents the cause of these movements. The table would have been more complete and instructive in this respect if a curve representing the fluctuations of prices throughout the period under consideration had been drawn thereon. Moreover, as has been said, to arrive at the true relation between the state of prosperity enjoyed by a wage-earner at two different periods, it is necessary to ascertain, not only the amount but also the purchasing power of his earnings. What is the relation, so considered, between the material prosperity of the working-classes to-day, and forty years ago?

Mr. Wood's chart only carries us from 1860 up to the year 1896, which was a year of trade depression. Nevertheless the curves show that wages stood 42 per cent. higher in 1896 than they did in 1860 and the two following years. If the curve could be carried up to the present day, it would undoubtedly show a very considerable further increase. The consumption of foodstuffs, cotton and wool, wine, spirits, and beer per head of population increased in the same period by 53 per cent. Mr. Wood does not give any data for arriving at the quantities of these commodities purchasable by each pound of wages earned in each of the years covered by his statistics; but information enabling one to institute such a comparison between the final years of each of the last five decades is to be found in an article in the current number of the "Contemporary Review," by Mr. M. G. Mulhall, on "The Imports and Exports of Forty Years." According to the statistics contained in this article, the consumption of imported food in 1899 was 800 lbs. per head of the population—valued on the average at £12 6s. per ton. In 1859 it was 200 lbs. per head, costing £19 per ton. That is to say that £1 will buy as much food now as would have cost £1 10s. forty years ago. The fall has been most marked in grain, meat, and groceries. The consumption of imported fibre (cotton, wool, flax, &c.) has increased from 680,000 tons per annum for the decade of 1865-9 to 1,300,000 tons per annum during 1895-9, while the value has fallen from £94 per ton to £37. In other words, £1 will at the present time buy as much raw material for making clothes as could have been purchased thirty years ago for £2 10s. 10d. So far as the imports of manufactured goods are concerned, it is not possible to give any reliable comparative figures, as thirty years ago we imported few manufactured goods except articles of considerable value, whereas now we get boots and shoes, hardware, and many other articles of cheap manufacture from abroad. It can, however, be safely said that, in respect of such goods, the working man gets much more for his money now than he did a quarter of a century ago.

There is one item in the worker's budget, of which no account was taken in Mr. Wood's paper, and that is the important one of rent. The tendency in all urban districts has undoubtedly been for rents to increase; and this fact must be set against the upward movement of wages, and the cheapening of the other necessities of life. The balance of advantage is, however, largely in favour of the working-classes.

In view of the present much inflated condition of trade and prices, it is interesting to note, from Mr. Wood's chart, how surely the high tide is followed by the ebb, and especially to observe the tremendous downward sweep of both the wages and the employment curves subsequent to the abnormally high-water mark of 1873—when coal and iron were as scarce and dear as at the present time. Were these curves continued up to this year, the first (the wages curve) would certainly go well beyond the level of 1873, and the second (the employment line) would be as high as it then was. But the improvement since 1888 has been much more gradual than that from 1869 to 1873; and, it is to be hoped, it will not be followed by so rapid and violent a fall. The fall will, however, be doubtless severe.

PERSONAL.

Mr. G. HOLLINS has recently been appointed Manager of the St. Ives (Hunts.) Gas-Works—the position formerly occupied by Mr. W. J. Best.

We learn that Mr. VINCENT HUGHES, Gas Manager and Secretary to the Tipton District Council, has obtained the appointment of Gas Engineer to the Smethwick District Council, in succession to Mr. B. W. Smith, who, as already announced, has gone to Walsall. Mr. Hughes is a member of the Gas Institute, having joined in 1883.

It has been resolved by the Town Hall Committee of the Manchester City Council to recommend the latter to confer the freedom of the city upon Alderman Sir JOHN HARWOOD, in recognition of his long and distinguished public service for the city. Sir John is Chairman of the Water Committee; and his name will always be associated with the great scheme by the accomplishment of which the water of Lake Thirlmere is carried to the city.

As will be seen by our "Notes from Scotland," Mr. W. B. M'LUSKY, of Selkirk, has obtained the appointment of Gas Engineer to the Perth Corporation, in succession to Mr. A. Wilson. Mr. M'Lusky, who is only 32 years of age, received practical training in gas manufacture and distribution at the Port-Glasgow Gas-Works, and was Assistant Gas Manager there from 1887 to 1891, when he was appointed Manager of the Kirkcudbright Gas-Works. In 1894, he was appointed Engineer, Manager, and Treasurer of the Kelso Gas-Works; and in 1897 the Directors of the Selkirk Gas Company offered him his present situation without competition. His work at Kelso embraced a scheme of complete renewal and extension of plant—all the plans and specifications being prepared by him in his leisure time. His work at Selkirk has resulted in the reduction of the price of gas from 3s. 9d. to 3s. 1½d. per 1000 cubic feet, and the leakage from 11 to 6 per cent. We congratulate Mr. M'Lusky upon his appointment, and cordially wish him continued success in his more extended sphere of work.

An interesting ceremony took place at the Crystal Palace District Gas-Works on Thursday afternoon, when a presentation was made by the officers and workmen of the Company to Mr. CHARLES M. OHREN, the Secretary, on the occasion of his silver wedding. The gift consisted of a silver epergne and two silver fruit dishes, with a commemorative inscription and an illuminated address: "To Charles M. Ohren, Esq., Secretary, Crystal Palace District Gas Company,—We, the undersigned, on behalf of the officers and workmen of the Company, desire to offer you our hearty congratulations and good wishes on the occasion of your silver wedding, and to ask your acceptance of the accompanying epergne as a token of our esteem and regard, and in recognition of the invariable kindness and courtesy we have received from you.—Signed, on behalf of the subscribers, Sydney Y. Shoubridge, Horace A. Floate, Harry J. Heading, J. W. Auchterlonie, William Maltster." The presentation was made, in the presence of a large gathering of the staff, by Mr. Shoubridge, the Engineer of the Company, who closed his remarks with the hope that Mr. and Mrs. Ohren might be spared to see not only their golden, but their diamond wedding—a statement which was very cordially endorsed by all present. Mr. Ohren expressed his great appreciation of the gift, and especially of the kindly feeling which had prompted it. He mentioned that he was now the oldest officer in the Company's service, having nearly completed his 32nd year. In that time he had seen many changes; but, fortunately, they had always secured good friends to fill the gaps which had been caused from time to time. He regarded this as a matter for congratulation, both on account of their personal comfort and the interests of the Company whose prosperity they all had at heart. Hearty cheers were given for Mr. Ohren, whose popularity was further attested by many personal congratulations, in which we cordially join.

NOTES.

Warming and Ventilating Engineering.

It is to be hoped that the formation, under promising auspices, of the new Institution of Heating and Ventilating Engineers will have the desired effect of raising the standard of this class of work in the United Kingdom. Several circumstances have contributed to the neglect in England of the science and technic of the systematic warming and ventilation of interiors, with the depressing result which is notorious. Mr. D. M. Nesbit, the President of the Institution, observed recently in his address to the members that domestic hot-water circulating work in this country has not received the amount of attention and development it deserves. The first step to improvement in this respect is the deliverance of hot water and steam heating and ventilation practice from the domination of Society plumbers. The next is to convince architects and influential people generally as to the importance of this branch of sanitation; so that it shall not continue to remain, like the artificial lighting, an afterthought in building. The appearance of the steam radiator in English buildings is still exceptional; but there are indications that it may in the immediate future run the gas-fire hard. It has already put the unwieldy hot-water heating coil in the shade. The standardization of radiators and their connections is already demanded; and the next few years may not impossibly see the warming and ventilation of town buildings placed upon the same degree of importance as the style of architecture of the frontage.

Pictet's New Oxygen Process.

It is reported from America that Professor Raoul Pictet, of Geneva, whose name is identified with the early liquefaction of air and other gases, has recently demonstrated a method of his own invention for the separation of the oxygen and nitrogen of the air at ordinary pressure and on a commercial scale. The process is described as simplicity itself. It begins with an initial production of a certain quantity of liquid air, which is stored in tubes. Then through this is forced a stream of air under a pressure of only about 1 atmosphere. This air is cooled by the liquid air; and as it escapes into a chamber beyond the refrigerator the two gases of which it is composed separate themselves by gravity only, and pass off at different levels. The oxygen, being slightly the heavier, flows off at the lower tube, while the nitrogen leaves by the higher pipe. In addition, the carbonic acid of the air is reduced by the low temperature to the liquid form, and runs off in this state. In the commercial machine, it is expected that, with an expenditure of 500-horse power, the daily output will be 500,000 cubic feet of oxygen, with corresponding yields of nitrogen and liquid carbonic acid. The last-named product is already a marketable commodity. A market for the oxygen in bulk has to be found. Professor Pictet proposes to apply it to the promotion of combustion at high temperatures, when the furnaces so worked might compete with those utilizing the electric arc. The nitrogen can be used for the production of nitric acid, and possibly in the synthesis of ammonia.

A New Paint Medium.

It is reported that a French Chemist, M. Le Roy, has suggested an innovation on the time-honoured preparation of paints for structural uses, by the substitution of a chloride of carbon, more particularly the compound known as carbon tetrachloride, for the turpentine or other spirit generally used as a solvent or diluent. The suggested turpentine substitute is described as a limpid, colourless fluid, boiling at 170° Fahr., and having a specific gravity of 1·56 (water being unity). Thus it is very volatile—much more so than turpentine, which boils at 330° Fahr.; while it is not inflammable, and its density is great. Both turpentine and methylated spirit are lighter than water—the spirit used to dissolve hard varnishes conspicuously so; and therefore when any paint containing a heavy pigment is mixed with them the colour soon falls down, and the paint must be frequently stirred to preserve its intended physical character. This is not always done by the painter. Carbon tetrachloride, being much heavier than water, tends to bring the specific gravity of the liquid portion of the paint nearer to that of the pigment itself, thus preventing rapid settlement. The advantage of a non-inflammable paint thinner is obvious; while the greater volatility of the carbon compound helps to make the paint or varnish dry more quickly. Moreover, the carbon tetrachloride can be employed in any proportions with all the usual paint solvents, including carbon bisulphide. The varnishes made with it are claimed to be exceptionally hard and brilliant. The cost is not stated.

Vacuum Steam Heating.

It appears from the proceedings at the last meetings of the Institution of Heating and Ventilating Engineers, that the latest approved kind of systematic warming apparatus for interiors is steam-heat radiation, at or below atmospheric pressure. Mr. Nesbit recommended this system of heating in a paper read at the January meeting of the Institution; and the subject was discussed at the meeting last month. It seems to be the outcome of a good deal of practical experience of different methods of systematic heating; and it is declared to be free from most of the defects of other methods. A feature of it is that all air is thoroughly extracted from the radiators and the piping; and air is the cause of most of the troubles of steam heating plants. Another advantage is the noiselessness of steam circulating at such low pressures. Exhaust steam from an engine can be adapted for heating in this way without throwing any back-pressure. In fact, the work of heating is done almost entirely by the latent heat; the condensed water coming back at very near boiling-point. Mr. Nesbit claims that very great economy of fuel over every other system of heating, is attainable by the vacuum plan of steam circulation, which, of course, entails an exhauster or vacuum pump. This is no great consideration for a large building or block of buildings; and the new system accordingly seems to be the most formidable rival to gas heating yet introduced for town use. It is at least something with which the sellers of town's gas must reckon in the near future, and is one more proof that gas does not enjoy a monopoly.

New Competitors with Gas.

Attention was lately drawn in this column to the appearance of a new competitor with the gas-cooking stove, in the petroleum "blue-flame," or wickless heating burner. Already these newcomers are making a large and increasing showing in the "Ironmonger" advertising pages. Gas manufacturers and their "sundrymen" are thus menaced with a novel and possibly highly effective form of competition, which can only be met in the ordinary commercial way by keeping up the standard of gas kitchener design and keeping down the price both of the gas and of the apparatus for burning it. Obviously, the way in which ironmongers have in most towns lost the trade in gas-stoves will inspire them with the desire to push the sale of the oil-heater, for which they also supply the fuel. While oil cooking and heating stoves, with wicks, are being offered as usual in new patterns for the season's trade, there are also being advertised oil brass and iron melting furnaces, and petroleum vapour cookers "of entirely novel construction," and of various makes. There are oil water-heaters on the "geyser" principle; and it is unnecessary to more than mention the vogue of the oil-engine. Lastly, in Germany at least, considerable headway is reported in the trade in incandescent spirit lamp lighting, which is recognized as a powerful rival to acetylene lighting. There is no prohibitive duty on alcohol in Germany; and consequently large quantities of spirit are used for industrial purposes. One of the most interesting of these is that of lighting with the aid of cheap incandescent mantles, thus making a portable light of high illuminating power and low cost.

Success with Water-Meters.

The town of Lexington, Kentucky, was reported by Mr. S. A. Charles to the American Water-Works Association as having 99 per cent. of the consumers' services metered. This is the result of 15 years' experience; and Mr. Charles strongly recommends the system. Success, it is admitted, largely depends upon the method of administration. The meters should be the property of the company or corporation, who can then keep them in working order; and they should be all of one make if possible. They should be fixed in boxes in the footpaths; so as to be readily accessible without troubling the householder. Portable testing plant, for the occasional satisfaction of the consumer, is provided in the shape of a tank containing 10 cubic feet. The Lexington meters are all geared to register only 99 per cent. of the water passing through them, which means that at ordinary temperatures the registration will always be in favour of the consumer. A common objection to a metered water supply is the complication of the accounts. This is obviated in Lexington as much as possible by making all entries in numbers instead of by names. Thus all accounts are made out to the number of the meter, not to the name of the consumer. One inspector indexes from 300 to 400 meters per day, reading to the nearest 100 cubic feet, except in the case of a final settlement. The system is strongly recommended for new districts, especially if of an industrial character, as preventing much discontent. It is obvious, however, that with town's water as cheap as it usually is in England, such a system would be an unnecessary expense to the consumer.

Some Particulars of Electric Incandescent Lamps.

Some interesting particulars of the incandescent electric lamp trade of America have been supplied to the Franklin Institute by Mr. Francis W. Willcox. Naturally, Mr. Willcox believes there was no such thing as ornamental or decorative illumination before the advent of electric lighting—probably never having seen an old French cut-glass chandelier. He remarks truly enough, however, that the adaptability of the incandescent electric lamp is greatly in excess of anything possible with other means of artificial lighting. A whole new field was opened by the production of miniature electric lamps, which are made of all shapes and sizes down to the "pea" lamp—no larger than a fair-sized pea, and ranging as low as one-quarter candle-power. One of the latest applications of these small lamps is to the telephone service, thus replacing the noisy bell signal by a silent flash of light. This is a boon to humanity. Actually, the regular trade knows lamps of nine different candle power ratings, three different economies, and at least six different bases. This makes 162 distinct types. Multiplied by the 50 different voltages recognized, there are thus 8100 distinct types of lamps in the ordinary trade—to say nothing of special orders. It is claimed that in

American electric lighting practice, the supply companies have taken the free renewal of lamps into their own hands, with the best results to the lamp trade. The rule is to renew the consumers' lamps whenever they show a falling off of 20 per cent. of their original rated illuminating power. The practical lifetime of all the leading makes of lamps is determined experimentally. So-called 16-candle power incandescent electric lamps are reported good so long as they do not fall below 12-candle power actual.

"The Law of London Gas Companies."—Under this title, Mr. Thomas J. Barnes, of the Middle Temple, has just published through the office of the "JOURNAL," as announced elsewhere, a synopsis of the public and private statutes affecting the Metropolitan Gas Companies, with comments and a short history. The book, to which we shall refer at greater length next week, is a section only, considerably varied for the present purpose, of a more comprehensive work on the whole law of lighting, which is practically ready for the Press.

Midland Association of Gas Managers.—The spring meeting of this Association will, as already announced, take place at Stafford next Thursday; and, though the amount of business to be transacted will be very small, the proceedings will be invested with special interest, inasmuch as the President (Mr. J. Ferguson Bell) will be the recipient of the hearty congratulations of his colleagues on his appointment to the position of Engineer and Manager of the Derby Gas Company. According to the programme issued by the Hon. Secretary (Mr. C. Meiklejohn, of Rugby), the members will be received by the Mayor (Alderman W. C. T. Mynors), who is Chairman of the Gas and Electricity Committee, and Alderman Wright, J.P., in the Council Chamber, shortly after noon. When the routine business has been transacted, they will proceed to the gas and electricity works of the Corporation, over which they will be conducted by Mr. Bell. In the afternoon, brakes will be provided to convey the party to Cannock Chase, Shugborough, and through Ingestre Park (the seats of the Earls of Lichfield and Shrewsbury), to Sandon, and thence back to Stafford. In the evening, the members will dine at the Swan Hotel, at the invitation of Mr. Bell.

The Electricity Generating Plant at the Paris Exhibition.—Although the electric lighting plant at the Paris Exhibition has not been "up to time," there is a manifestation of a determination to show that it is at all events "up to date," for the Editors of the two principal Paris electrical papers—M. Hospitalier, of "L'Industrie Electrique," and M. Montpellier, of "L'Electricien"—are, with the assistance of 33 well-known engineers and writers on electro-technical subjects, publishing in a series of numbers a complete account of the installation. Owing to the backwardness of the arrangements at the Exhibition, only one number has appeared; but our contemporary the "Electrician" says that if the remainder attain the same standard of excellence and command of detail as this, the publication will be a valuable one. It furnishes particulars as to the general organization of the electricity supply service, from which it appears that the total output is 20,245 kilowatts, necessitating altogether 36,155 indicated horse power at the engines. It is gratifying to find that, notwithstanding the encouragement which was doubtless given to French and German firms to do their best at this great show, the largest output of electricity is made by two British firms—Messrs. Siemens Bros., Limited, and Messrs. Willans and Robinson, Limited—the 2400-horse power engine of the latter coupled to the 1340-kilowatt dynamo of the former sending out 2630 ampères of continu ous current at 500 volts. This is not the biggest set in the Palace of Electricity; and its large output is due to its high speed.

British Association of Water-Works Engineers.—The fifth annual general meeting of the Association will be held at Cardiff, on the 19th inst. and three following days, under the presidency of Mr. C. H. Priestley, the Water Engineer to the Corporation. According to the programme issued by the Secretary (Mr. Percy Griffith), the proceedings will be opened in the Council Chamber of the Town Hall with a reception by the Mayor (Mr. S. A. Brain, J.P.), who will welcome the Association to Cardiff. The business will be transacted at the South Wales Institute of Engineers. Two papers will be read—viz., "The Rating of Water Undertakings," by Mr. F. J. Bancroft, B.Sc., of Hull; "The Relationship between the Cost of Water Wasted and the Cost of Detection and Prevention of Waste," by Mr. A. J. Jenkins, formerly Assistant Water Engineer at Cardiff. In addition, there will be a lecture by Dr. A. C. Elliott, Professor of Engineering in the University College of South Wales, on "The Strength of Bricks and Brickwork," with demonstrations on the 100-ton testing machine; and descriptions of the Cardiff, Pontypridd, Rhondda, and Barry Water-Works will be circulated. The visits and social functions include inspections of the Bute Docks, the Barry Docks and Water-Works, the Dowlais Iron-Works, the Cardiff Water-Works, the Lewis Merthyr Collieries, and the Merthyr Tydfil Water-Works; the annual dinner at the Esplanade Hotel, Penarth, on the evening of the 20th; and various luncheons. For members remaining over Saturday, the 23rd, pleasant steamboat excursions could be arranged. The meeting promises to be a most instructive and enjoyable one for all able to take part in it.

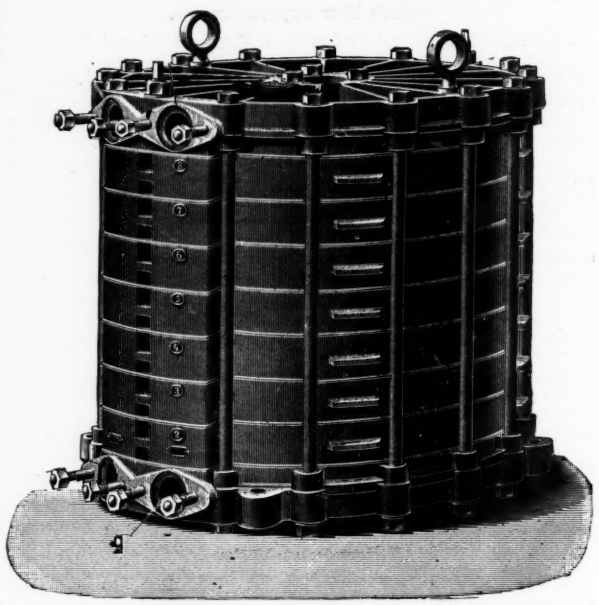
COMMUNICATED ARTICLE.

A GERMAN FORM OF CONDENSER.

By THEODOR HILLER, of Charlottenburg.

Making gas from English coals, it sometimes happens that naphthalene appears in a disagreeable manner and quantity in our gas-mains. However sufficiently cooled, great quantities of naphthalene deposits are at times found in the connections between the condenser-washers and the scrubbers; so that blocked service pipes interrupt the gas supply.

To avoid producing naphthalene, as well as to get out most of the ammonia from the gas, an ammonia-water condenser is employed at my works, manufactured by Messrs. Pape, Henneberg, and Co., of Hamburg. As shown in the engraving, the apparatus is constructed of cast-iron plates fitted on both sides with channels in spiral shape. These plates are put upon one another; and the channels of two neighbour-plates are separated by wrought-iron sheets in order to communicate heat from one channel to the next. The channels of one plate communicate with the channels of the next plate by small chambers cast into the plates. By this device, there are secured two connecting channel-ways, one for the ammonia water, in order to be cooled, the other one for the cooling water itself. Both fluids pass through the apparatus pretty quickly, in contrary directions; being separated only by the temperature-sheets, which are made of wrought iron.



The device secures a splendid exchange of warmth, and completely cools in the same way, as can be seen from the following figures: The ammonia water, 15 litres a minute, enters at a temperature of 30° R. into the condenser, and leaves it at 13·5° R. The cooling water enters at a temperature of 12° R., and leaves at 13·5° R. The apparatus, however, is easily able to deal with a quantity of 40 litres a minute. Therefore, it possesses in the Charlottenburg Gas-Works 2·7 times more cooling capacity than will cool the ammonia water down to the desired temperature.

Referring to the content of ammonia in the coal gas, the following particulars may be mentioned. By using the ammonia-condenser and working in the "Standard" washer-scrubbers with cooled ammonia water, the content of ammonia is thus stated: Entering the "Standard" washers, the gas contained 241 grammes of ammonia; and leaving the scrubbers, there was only found 1 gramme of ammonia per 100 cubic metres of gas—a record that at no former time has ever been reached. Meantime deposits of naphthalene were not noticed.

By introducing these condensers, we obtain a considerable augmentation of ammonia water, by which the pecuniary returns from that product have largely increased. The capital outlay for the condensers is soon covered by the larger income from the increased ammonia water. They need only a small place for installation, do not require any attendant, and can be easily dismounted for cleaning purposes. The cooling water may be used afterwards for several kinds of purposes—for instance, as feed-water to boilers, for extinguishing coke, and so on.

The value of the services rendered by Mr. John Chew as Gas Engineer to the Blackpool Corporation have been frequently deservedly recognized by members of that body, and especially by those constituting the Gas Committee. We are pleased to find, therefore, that the appreciation of the latter was testified at their last meeting by an advance of £100 per annum in Mr. Chew's salary.

TECHNICAL RECORD.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

Excursion Meeting in Bristol.

The Spring Meeting of the above-named Association was held in Bristol last Thursday, under the presidency of Mr. D. IRVING, Assoc.M.Inst.C.E., the Superintendent of the Stapleton Road works of the Bristol Gas Company. There was a good attendance of members and friends. At the invitation of the President, luncheon was partaken of at the Royal Hotel, when the usual loyal toast was cordially honoured, accompanied by the singing of the National Anthem. Mr. C. C. Carpenter proposed "The President;" and the toast was heartily received. In responding, Mr. Irving remarked that the Southern District Association had been most favoured in its meetings. On the last occasion they heard the heart-cheering tidings of the relief of Ladysmith; and now they had the additional glad news that Lord Roberts was almost in possession of Pretoria. The Hon. Secretary (Mr. J. W. Helps) then read a description, prepared by the President, of the arrangements made for the prevention of electrolysis in the gas and water mains in Bristol. This will be found on p. 1501. At the close of the business, the members paid a visit to the St. George and city electric power stations, and drove through Clifton to the Zoological Gardens, where high-tea was served. The weather was fine, and a most enjoyable day was spent—the beautiful neighbourhood of Clifton being seen at its best.

THE GUIDE-FRAMING OF GASHOLDERS.

The following is an abstract translation of a paper on this subject by Herr Hacker, of Berlin, which originally appeared in the "Journal of the Association of German Engineers," and has been reproduced by our Austrian contemporary "Der Gastechniker."

I.—*Uncertainty as to the Distribution of the Pressure of the Wind on the Ordinary Guide-Framing.*

It is impossible to determine exactly the pressures which have to be taken up by any one roller of a gasholder which is guided by a large number of rollers and is exposed to the force of gales and the weight of snow. Even though every scientific means be used to estimate these pressures, the result will not be reliable; for in the estimation it will necessarily have been assumed that the rollers bear closely on their guide-rails, whereas in structures of such magnitude as gasholders, the most exact construction does not make this possible. When the holder stands at a given height, and the temperature is known, the exact bearing of the rollers on the guides can be attained by means of adjustable rollers; but when the holder is at some other height, or the temperature is different, the rollers will no longer bear closely on the guides. The iron structure of the holder and the surrounding framing rapidly respond to fluctuations of temperature, and expand or contract accordingly; whereas the substructure of the framing, which is below the level of the ground, undergoes little or no change of form on the same account. In addition, the bell is subjected to changes of form due to the force of gales and to the radiation of the sun striking on one side of it.

These considerations make it evident that very precisely adjusted rollers must result in jamming. In actual cases in point, it will be noticed that only about 3 out of 18 or 24 rollers are in contact with their guides; while there is a clear interval between the other rollers and the guides. Hence the material is subjected to very great strains. If in fig. 1 the larger circle is taken to represent the guiding surfaces of the guide-rails, and the smaller circle the similar surfaces of the guide-rollers on the

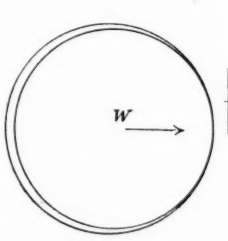


Fig. 1.

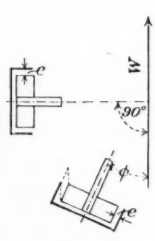


Fig. 2.

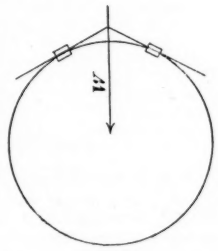


Fig. 3.

rigid crown of the holder, then for any given direction of the wind there is only one roller, which takes up the whole of the pressure. That this is so may be readily seen if the case is regarded in which the wind throws the holder from one side to the other, when the lower curb, on account of the water which has to be displaced, follows the movement of the upper part slowly. Thus a great shock occurs, just as, for example, when snow slides off from one side of a holder when in use, a standard on the opposite side snaps. The flexibility which the cups afford favours the assumption that their radial rollers grip the guides better than those of the crown; but in this case, also, distribution of the pressure on a greater number of rollers can by no means be relied upon. With tangential rollers it is much the same. If in fig. 2 the axis of one tangential roller is regarded as inclined by 90°, and that of another by ϕ to the direction of the wind, while the indispensable play e is equally great for all the rollers, then the first roller has to traverse a distance e and the second a distance e sec. ϕ in order to make contact with their guides. The latter distance is the greater; therefore the first roller alone comes in contact, and the whole pressure actually has to be borne by two rollers.

In the case of a flexible cup, it is quite possible that other rollers will also come in contact with their guides, but the effect is questionable. Indeed, if the construction is not very exact, it is not improbable that two rollers not far distant from one another will first make contact, as is shown in fig. 3, and will have to bear the whole force of the wind at a very high pressure. Such a case may readily happen with flexible cups, as the force of the wind presses in that part of the wall of the gasholder on which it strikes, and so tends to flatten it. The distance between two rollers may thus be so much increased, that, if only the usual small amount of play exists, they will be pressed against the guides; while the other rollers will not touch their guides.

II.—*Three Independent Columns for Guiding a Gasholder.*

The evils indicated in the foregoing can be avoided by guiding the holder at three places only, as is pourtrayed in figs. 4 and 5. The crown of the holder is circumscribed by a rim, which engages with the columns through guide rollers, as is shown in fig. 6. Both rim and rollers are supported by the top curb; but are not rigidly fastened to it. The rollers R are guided by the column E, and are attached to a frame A, which is supported by the bearers B secured to the crown, and is so arranged

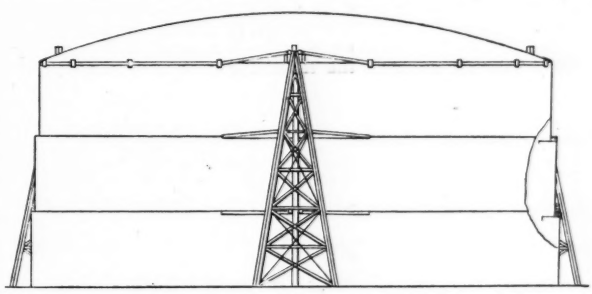


Fig. 4.

Fig. 5.

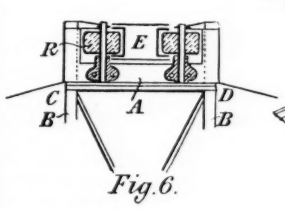


Fig. 6.

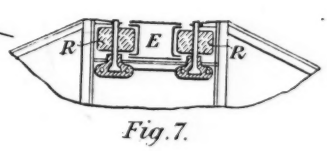


Fig. 7.

that it can slide on the base C D. The spindles of the rollers can move to and fro in their bearings. Tangential contact only can occur, not radial contact. In order that the bell may not be able to turn completely within the rim, the latter is rigidly fixed to it at a point about midway between two columns; elsewhere it is retained by eyes only to the crown of the bell.

Supposing the holder is inclined to one side, it rests for a long distance on the rim, which takes up the pressure. If the wind heaves it over from one side to the other, the first force of

the shock is taken up by the stretching of the rim, which had not previously been strained; and thus the effect of the shock on the rollers and their carriages is much diminished. For the cups, it appears more advantageous to make the rim of angle-iron; and to connect it by lattice work with the cup, as is shown at the right-hand side in fig. 5. The cups are thereby stiffened, and protected against severe deflection.

The forces at the standards are transmitted to the outer cups by plates in frames of angle-iron, 20 to 26 feet long, joined to the cups by a large number of rivets, so that no single rivet is subjected to excessive strain. For the guiding of the rollers which are at the cups, provision is made for the transmission not only of tangential but also of radial pressure to the standards. These rollers are therefore rigidly fixed, as shown in fig. 7.

As the encompassing fence of framing hitherto common is replaced by only three columns, this method of guiding costs, inclusive of rims, rollers, &c., less than half the usual method —even if the unsubstantiated distribution of pressure on the rollers is assumed in the case of the latter, and no account is taken of the above-mentioned lessening of the shock. In both instances, the same co-efficient of tensile strength of iron, and the same pressures of wind and of snow, have to be taken.

The crown and cups may be inspected when in any position by means of a winding stair alongside one of the columns, and a short step. For ready access to the cups, the rims mentioned above may be shifted towards the outside instead of the inside, and protected by means of plates. Railings could be fixed to the cups, so that the one on the lower cup projects beyond that on the upper; and, consequently, the railings would slide one within the other when the cups were in their lowermost positions. The lifts might be, as usual, guided against one another and the tank, by means of tangential or radial rollers running on guide-rails.

III.—*Calculation of the Ring round the Crown, and of the Forces transmitted to the Columns.*

The calculation of the ring round the crown, and of the forces transmitted by it through its rollers to the columns, is very simple. There are but three forces, in a tangential direction, which have to be taken up by the standards; and these are readily ascertained from the three static equations which are

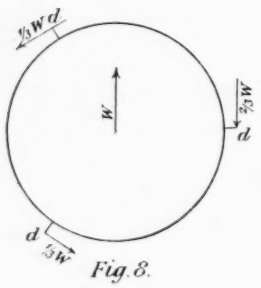


Fig. 8.

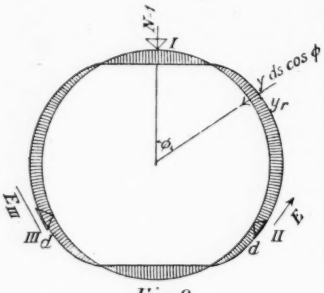


Fig. 9.

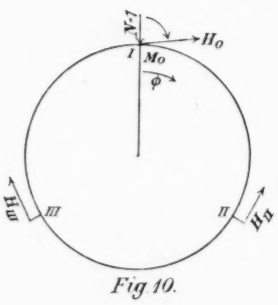


Fig 10.

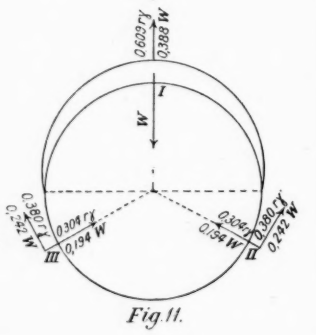


Fig 11.

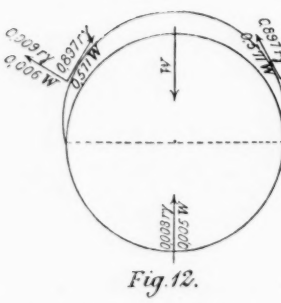


Fig. 12.

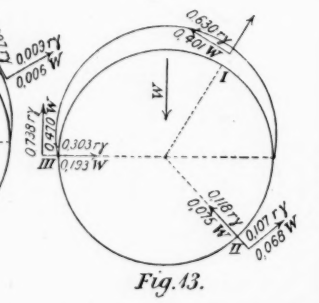


Fig. 13.

applicable to the case. The greatest force occurs with the wind in the direction shown in fig. 8, and amounts to two-thirds of the total thrust W due to the wind pressure. The strength of the ring must be calculated on this basis. The forces which the cups transmit to the columns are not so readily determined. These forces are not only directed tangentially, but, on account of the elasticity of the cups, radially also. The cups must be regarded as consisting of elastic rings, to which are fastened at equidistant points three stays, which are hinged at their ends d (fig. 8) to fixed points—viz., the middle of the guide-columns. The resistances exerted at the points d on the columns may be each resolved into a radial force N, and a force H at right angles thereto. There are then six unknown quantities, and only three static equations embodying them. The problem is, therefore, insoluble. But it is to be observed that the three forces N—but not the three forces H—have to be regarded as statically supernumerary; for, in certain directions of the wind, one of the forces N would suffice to take up the pressure of wind.

The three forces N might be determined in various ways, but best of all by the application of Maxwell's law in the following manner. It is first assumed that the point d may be radically shifted; and it is then determined what radial displacements a force N_1 directed on the column I effects at any point of the ring. These radial displacements are shown by the shaded surfaces in fig. 9. If γ is the pressure of the wind on that unit length of the ring which is at right angles to the direction of the wind, then there falls on the stretch ds of the ring, which makes an angle ϕ at the centre with the direction of the wind, a normal pressure $\gamma \cos \phi \, ds$. Supposing the radial displacement at this position is y_r, the radial displacement resulting therefrom at N_1 is $\gamma \, ds \cos \phi \, y_r$. In this manner, the displacement produced at N_1 by the total pressure of the wind may further be found. The pressure of the wind, however, likewise produces radial, and at first unknown, forces N_{II} and N_{III} on the columns II. and III. These forces may be determined in the manner indicated above for the displacement caused at N_1; and they may be expressed by N_{II} and N_{III}. The point I does not become displaced radially; and one must, therefore, assume that there is there a force N_1 such that it throws back this point into its original position, and that this displacement for $N_1 = N_1 = 1$, and that the displacements are proportional to the forces. The same method of investigation can be applied to the columns II. and III.; and in this manner three equations can be found, from which the three unknown forces N_1, N_{II}, and N_{III}, and their reactions at H_1, H_{II}, and H_{III}, can be ascertained.

To find out the displacements of a force $N = 1$, let us imagine the force operating at I in fig. 10, and directed radially inwards, and, further, the ring cut through directly on both sides of the support. Then, in virtue of symmetry, there acts at each cut end, a force $\frac{N}{2}$, an unknown moment M_0, and an unknown tangential power H_0—both positive in the sense indicated in fig. 10. If y_r is the displacement of a point radially, then $\frac{d^2 y_r}{ds^2} = \frac{M}{EJ}$ in which M is the moment at this point, E the modulus of elasticity, and J the moment of inertia of the ring. As the ring is formed of bar-iron work, the dimension J can be sufficiently exactly found by taking for the calculation the two webs only. E and J might be assumed to be invariable.

$$\text{From } \frac{dy^2}{ds^2} = \frac{M}{EJ} \text{ we get}$$

$$\frac{dy}{ds} = \int \frac{M}{EJ} \, ds = \int \frac{M}{EJ} \, r d\phi$$

It is required to determine the displacements denoted in fig. 10 horizontally and taken as positive to the right with y_w, and the values at right angles taken as positive upwards with y_1.

The origin of the ordinates may be at I. The x-values may be regarded as positive for y_w to the right, and for y_1 downwards. Then we have further $\frac{dy_r}{ds} = \frac{dy_w}{dx} = \frac{dy_1}{dx}$. These values denote the angles between the line of flexure and the circle, which are equally great for each system of co-ordinates.

From the above, it follows:—

$$y_w = \int \frac{dy_w}{dx} \, dx = \int \frac{M r d\phi}{EJ} \, dx$$

and as $dx = r d\phi \sin \phi$

$$Y_w = \frac{r^2}{EJ} \int M \sin \phi \, d\phi$$

Similarly it is found that

$$y_1 = \frac{r^2}{EJ} \int M \cos \phi \, d\phi$$

and finally

$$y_v = y_w \sin \phi + y_1 \cos \phi.$$

Moreover,

$$M = M_0 + H_0 r (1 - \cos \phi) - \frac{\overline{N} r}{2} \sin \phi$$

For $\phi > 120°$ there is still at M the moment for H_1. It is $H_1 = \frac{2}{3} \sqrt{\frac{3}{4}} N$. If the length of the support is assumed to be on the average $0{\cdot}04r$, then the moment for H_1 is equal $-H_1 r (1{\cdot}04 - \cos \phi_1)$ where $\phi_1 = \phi - 120°$.

It would go beyond the limits of this paper to proceed further with the calculation; and it need only be observed that the constants of the integrals and the unknown values for H_0 and M_0 are to be determined from the following conditions:—

1.—For $\phi = 0$ and $\phi = 180°$

$$\frac{dy_w}{dx}, \frac{dy_1}{dx} \text{ and } y_w \text{ are} = 0$$

2.—The ends d of the supports at the points II. and III. for $\phi = 120°$ and $= -120°$ can only be displaced in a radial direction.

The radial displacements are found with N = 1, for ϕ between 0 and 120° thus:

$$y_r = \frac{r^2}{EJ}\left(M_0 + H_0 r\left(1 - \frac{\phi}{2}\sin\phi\right) - \frac{\overline{N}r}{2}\left(\sin\frac{\phi}{2} - \frac{\phi}{2}\cos\phi\right) + C\cos\phi\right)$$

and for ϕ between 120° and 240°, thus:

$$y_r = -\frac{H_1 r^3}{EJ}\left(1{\cdot}04\,(1 - \cos\phi_1) - \frac{\phi_1}{2}\sin\phi_1\right)$$

in which $\phi_1 = \phi - 120°$; $\overline{N} = 1$; $M_0 = 0{\cdot}28363r$; $H_0 = 0{\cdot}07568$; $H_1 = 0{\cdot}57735$; $C = -0{\cdot}44002r$. The force $\overline{N} = 1$ shifts its point of application radially by $\frac{-0{\cdot}08071r^3}{EJ}$, and the points of the ring on both columns II. and III. by $\frac{0{\cdot}03239r^3}{EJ}$

If the direction of the wind forms with the radius, with $q = 0$, the angle a, the normal wind pressure on a length of the ring ds is equal to $\gamma r d\ \phi \cos(\phi \pm a)$. With this value the formulæ I. and II. are to be multiplied, for integration within the pressure of the wind extending over a semicircle, and so proceeding to the determination of the unknown normal forces N on the supports, as is shown above. In figs. 10, 11, and 12, the results are given for three cases, and for twelve directions of the wind, in which W denotes the total wind pressure, equal to $\frac{\pi}{2} r^1, \gamma$.

IV.—*Strain of the Cups.*

The bending strains, which the cups have to withstand in virtue of their taking up the pressure of the wind and transmitting it to the columns, are similarly determined. The ring is again regarded as severed at one point; and by estimating the unknown forces and moments at that point, having regard to the given wind pressure, equations and integrals are obtained for the deflections. The conditions which the latter impose on the columns then lead up to the determination of the unknown forces, moments, and integral constants, as well as the resulting deflections. Only that case which produces the greatest strains need be taken into consideration here—viz., when the wind pressure bears as far as possible obliquely on the cups. This occurs with the direction of the wind, shown in fig. 11.

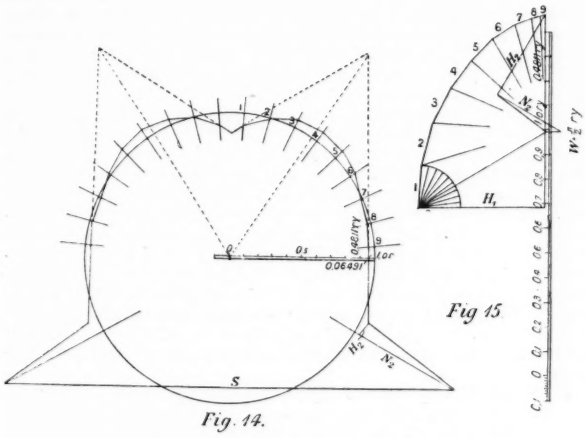


Fig. 14.

Fig 15

A pressure line for the wind pressure, according to these calculations, is shown in fig. 14, and a plan of the forces for the wind pressure in fig. 15. These will be seen to agree, if allowance is made for the small errors of every graphic construction. In the left-hand lower corner of fig. 15, the value of the wind pressure decreasing to cos ϕ can be measured off. Exact calculation gives the moments at column I. as follows: For $\phi = 0$: $-0{\cdot}0627\,r^2\gamma$; for $\phi = 35° 55'$: $+0{\cdot}0298\ r^2\gamma$; and for $\phi = 88° 30'$: $-0{\cdot}0312\ r^2\gamma$. The latter is the greatest moment between the columns. It is made up of a force $H = 0{\cdot}4811\ r\gamma$, and an arm of a lever $0{\cdot}0649\ r$, which can be checked by subsequent measurements by the polygon of forces. For example, if the radius of the cup is 27 metres, the height of the lift 8 metres, and the wind pressure 200 kilos. per square metre, then

$$M \text{ max} = 0{\cdot}0312 r^2\gamma = 0{\cdot}0312 \times 2700^2 \times \frac{200 \times 8}{100} =$$

3640·500 kilo-centimetres.

On account of the share taken by the second cup, about 3500·000 kilo-metres may be taken into calculation. If the structure of the rings, measured horizontally—*i.e.*, into the cups in addition to the ring—amounts to 150 centimetres, it gives this an elasticity of $\frac{3500{\cdot}000}{150}$ 23·333 kilos. For this the ring attached to the cups must, for a strain of 1000 kilos. per square centimetre, have an effective cross section of 23·33 square centimetres. As pointed out above, under heading II., special stiffening of the columns is necessary on account of the greater maximum moment of $-0{\cdot}0627r^2\gamma$. With the height of the cups taken at 150 centimetres the deflections are trifling—only 3 centimetres, and they are even diminished further by the supporting action of the gas pressure.

ELECTROLYSIS IN GAS AND WATER MAINS.

The Bristol Method for its Prevention.

At the Meeting of the Southern District Association of Gas Engineers and Managers in Bristol last Thursday, the following paper, prepared by the President (Mr. D. Irving), was read.

The introduction of electric traction in the crowded streets of our large cities naturally caused considerable apprehension to the various gas, water, lighting, telegraph, and telephone companies who were already in possession of the subsoil. Grave fears were entertained, and not without reason, for the safety of the mains and cables of these companies. The Bristol Tramways Company being one of the pioneers in the introduction of electric traction in England, it was thought that a brief account of the regulations made by Parliament in the Acts of the Company, and the regulations issued and enforced by the Board of Trade, for the protection of the mains of the Water and Gas Companies concerned, and of how these regulations had been practically carried out by the Traction Company, would be of interest to the members of this Association, especially as electric traction is now being so largely adopted throughout the country.

With electric lighting systems, whether the supply is high-tension alternating currents or high or low tension continuous currents, all conductors are continuously insulated throughout their entire length, and, as a rule, in the best possible manner, with the result that it is not probable, and some electricians say not possible, that there should be any stray current to escape that would seriously affect gas and water pipes. It will be readily understood that where such leakage does take place the fault is immediately developed, and the main is at once automatically burned out, cutting off the current. The slightest leakage can also easily be detected by the daily tests. And, further, it is evidently of such vital importance to the electric lighting undertaking to prevent all such loss, that they may safely be relied upon to guard their own interests.

It is now generally accepted that with well insulated and strongly armoured cables and connections no fear of electrolysis of water or gas mains need be feared from lighting installations. The electric system employed for traction generally is the continuous uninsulated one. The overhead trolley wire is fed from the positive pole of the generator; the current passes through the motors fixed under the cars, performing its work of propelling, and is then delivered to the rails, which, as you know, are connected to earth throughout their entire length. Up to this point the circuit current is confined to a definite path; but on reaching the rails the trouble begins. The current may follow the rail back to the power station, or ramify through the earth to the nearest water or gas main—always, of course, like all forms of pent-up energy, taking the path of least resistance. It is the current passing from one metallic body to another, especially when embedded in certain classes of city earth, that causes electrolysis of rails and pipes. If the current in running along the rail reaches an open joint, it will pass into the earth and back into the rail or nearest pipe, and so on in and out.

It will be at once seen that the whole question of leakage and electrolysis depends upon the proper electrical bonding of the rails, which are sufficient in themselves, except on very large sections, and offer abundant conductivity to carry the current. The bonding of these rails has been a matter of much study and gradual development. Great improvements have been made since the first introduction of electric traction in this country. The tram rails in Bristol have a sectional area of 8·9 inches, and are "fished" together with no less than five plates—one on each side of the web in the usual manner, and one covering the entire under side and two strips on the upper side of the bottom flange of the rail, bolted up with 14 bolts. The rails are double bonded at each joint with copper bonds $\frac{7}{16}$ inch diameter, electrically connected to the web of each rail. There is also a third electric connection formed by Edison's plastic bond, carefully prepared and fixed between the rail and the fish-plates. In addition to these bonds, and in order to make certain of one continuous conductor, a double cross copper bond is fixed every 120 feet length of rail, so that, should any individual rail bond fail, the cross bonds, which are each $\frac{7}{16}$ inch diameter, will take up the current. No less than 7s. per single joint is being spent on electric bonds by the Traction Company, in order to secure the property of their neighbours and the economical and profitable working of their own undertaking.

In addition to this careful and improved system of bonding rails, so as to retain the return current and make the rails the way of least resistance, a "booster" has been introduced by the Consulting Engineer of the Tramways Company, whereby the negative current is drawn from the tram rail very much in the form of a gas-exhauster drawing gas.

In the Bristol Tramways Act, 1894 (57 & 58 Vict.), the following clauses, forming part of section 31, were inserted for the protection of the Bristol Gas and Water and other Companies:—

1.—The Company shall employ either insulated returns or uninsulated metallic returns of low resistance.

2.—The Company shall take all reasonable precautions in constructing, placing, and maintaining their electric lines and circuits, and other work of all descriptions, and also in working their undertaking, so as not injuriously to affect, by fusion or electrolytic action, any gas or water pipes, or other metallic pipes, structures, or substances.

3.—The exercise of the powers by this Act conferred with respect to the use of electric power shall be subject to the regulations set forth in the first

schedule to this Act, and to any regulations which may be added thereto or substituted therefor respectively by any order which the Board of Trade may, and which they are empowered to, make from time to time, as or when they may think fit, for regulating the employment of insulated returns, or of uninsulated metallic returns of low resistance, for preventing fusion or injurious electrolytic action of or on gas or water pipes, or other metallic pipes, structures, or substances, and for minimizing, as far as is reasonably practicable, injurious interference with the electric wires, lines, and apparatus of other parties and the currents therein, whether such lines do or do not use the earth as a return.

4.—The Company using electric power contrary to the provisions of this Act, or to any of the regulations set forth in the first schedule to this Act, or to any regulation added thereto or substituted therefor by any order made by the Board of Trade under the authority of this Act, shall for every such offence be subject to a penalty not exceeding ten pounds, and also, in the case of a continuing offence, to a further penalty not exceeding five pounds for every day during which such offence continues after conviction thereof: Provided always that, whether any such penalty has been recovered or not, the Board of Trade, in case, in their opinion, the Company, in the use of electric power under the authority of this Act, have made default in complying with the provisions of this Act, or with any of the regulations set forth in the first schedule to this Act, or with any regulation which may have been added thereto or substituted therefor as aforesaid, may by order direct the Company to cease to use electric power, and thereupon the Company shall cease to use electric power, and shall not again use the same unless with the authority of the Board of Trade; and in every such case the Board of Trade shall make a special report to Parliament notifying the making of such order.

The Board of Trade have also issued, and carefully enforced, the following regulations:—

6.—When the return is partly or entirely insulated, the Company shall, in the construction and maintenance of the tramway, (*a*) so separate the insulated return from the general mass of earth and from any pipe in the vicinity, (*b*) so connect together the several lengths of the rails, (*c*) adopt such means for reducing the difference produced by the current between the potential of the uninsulated return at any one point and the potential of the uninsulated return at any other point, and (*d*) so maintain the efficiency of the earth connections specified in the preceding regulations, as to fulfil the following conditions—viz.: (1) The current passing from the earth connections through the indicator to the generator shall not at any time exceed either 2 ampères per mile of single tramway line or 5 per cent. of the total current output of the station. (2) That if at any time and at any place a test be made by connecting a galvanometer or other current-indicator to the uninsulated return and to any pipe in the vicinity, it shall always be possible to reverse the direction of any current indicated by interposing a battery of three Leclanché cells, connected by series, if the direction of the current is from the return to the pipe, or by interposing one Leclanché cell if the direction of the current is from the pipe to the return. In order to provide a continuous indication that the condition (1) is complied with, the Company shall place in a conspicuous position a suitable, properly connected, and correctly marked current-indicator, and shall keep it connected during the whole time the line is charged. The owner of any such pipe may require the Company to permit him, at reasonable times and intervals, to ascertain by test that the conditions specified in (2) are complied with as regard his pipe.

7.—When the return is partly or entirely uninsulated, a continuous record shall be kept by the Company of the difference of potential during the working of the tramway between the points of the uninsulated return farthest from and nearest to the generating station. If at any time such difference of potential exceeds the limit of 7 volts, the Company shall take immediate steps to reduce it below that limit.

You will note that the latter part of clause 7 of the regulations provides that the difference of potential shall not exceed the limit of 7 volts. I am glad to be able to inform you that the potential difference in Bristol does not now exceed from 2 to 3 volts—a result unheard of some two or three years ago.

However much some may be inclined to regret the introduction of electric traction in our crowded streets, there is no doubt that it renders a great public service. A system which can take a workman from his work in the city, and put him down nearly at his own cottage door, three or four miles out in the country, for the sum of one penny, is well calculated to assist towards solving the pressing problem of overcrowding in our large cities.

The Bristol Tramway Company are, I understand, spending over half-a-million pounds in improving and extending their system; and I feel compelled to express my admiration for the bold, enterprising, and generous conception of their schemes, and the energetic, persistent, and thorough manner in which all their work is executed by the Managers and Engineers of the Company.

A CENTURY OF CHEMISTRY AT THE ROYAL INSTITUTION.

In previous issues of the "JOURNAL" (pp. 1108, 1354) we have noticed the course of four lectures which Professor Dewar has been giving at the Royal Institution on the above subject. In his third lecture, he completed his account of Davy's scientific work, and went on to refer to that of Brande, who was connected with the Institution for forty years. He described Brande as a man of great culture, whose reputation was high as a lecturer. His chief work was on the borderland between chemistry and physiology; but he was not an investigator of the first rank. Passing on to Faraday, Professor Dewar gave a list of his chemical investigations. In organic chemistry his chief work opened up new ground, for he first prepared compounds of chlorine with carbon, and also combined iodine with a hydrocarbon. He was in a position to extend, by the use of the galvanometer, the electro-chemical inquiries of Davy. Another subject investigated by him was the limits of evaporation. His work in this direction was parallel to Davy's attempts to get high vacua in order to discover the behaviour of electricity in space as nearly void of matter as possible. Davy perceived that the Torricellian vacuum would be improved by cooling. This led to the discussion of Faraday's work on the liquefaction of gases, which began when, at Davy's suggestion, he heated hydrate of chlorine in a closed tube, and obtained liquid chlorine. Faraday fully appreciated the possibility of utilizing liquefied gases for the attainment of very low temperatures, and was the first to employ ethylene, now in common use for the purpose.

In his concluding lecture, Professor Dewar spoke further on the subject of Faraday's work—dealing with that distinguished investigator's achievements in organic chemistry. He said Faraday succeeded in what appeared to be the surprising feat of replacing the hydrogen in an organic body with an electro-negative substance like chlorine; he was also the first to obtain what would now be called a sulpho-acid, by dissolving naphthalene in sulphuric acid. Another fortunate discovery he made was benzene, which formed the basis of the whole coal-tar industry, and was also important from another aspect, inasmuch as Kekulé's theory of the structure had influenced the whole theory of modern chemistry. Faraday's work in organic chemistry received a great extension at the hands of the late Sir Edward Frankland, his successor, the scope and variety of whose researches made him second to none as an experimenter of the modern type. His work was largely identified with organic synthesis; and he was the first to formulate the conception of atomicity. In the domain of physical chemistry, one of his investigations had to do with the theory of flame. He found that the luminosity varied as the pressure of the atmosphere in which the flame was burning; and hence he argued that it could not be due altogether to the presence of solid incandescent particles. His technical work included elaborate investigations on water supply and on coal gas manufacture and analysis.

THE OXIDATION PROCESS FOR SEWAGE TREATMENT.

A series of lengthy articles by Professor Dunbar, of Hamburg, has lately come to a conclusion in the "Journal für Gasbeleuchtung." In the course of them, the author deals with the whole question of the biological processes for the purification of sewage in a very exhaustive manner. He commences with a critical retrospect of the methods for the treatment of sewage, in which he indicates that the so-called biological processes are based on fundamental ideas which have been known and put to the test long ago. They effect the purification of the liquid on the principle of intermittent filtration, which has been practically applied for a century in the irrigation processes. The biological processes, however—whether the oxidation process or the septic tank process—hasten the working in comparison with the irrigation process, through the use of oxidizing bodies made artificially from the most suitable materials in place of the natural cultivated soil. Intermediate between the former processes and the irrigation process lies the method of purifying sewage adopted in many towns of the United States, which consists in the intermittent filtration originally suggested by Frankland, carried out on open drained tracts of land. This process, by disregarding the production of crops, affords a heavy saturation of the soil with sewage, though not to the extent to which the artificial oxidizing bodies in an impervious tank can be soaked with the sewage.

Professor Dunbar proceeds to show that no single process can be considered applicable in all cases; and he gives many hints on the selection of the process to be adopted in particular instances of sewage purification. The disinfection of town sewage, and the destruction of pathogenic organisms in it, he treats as a distinct question, quite independent of the purification of the effluent. He then refers to the experimental works erected and tried in Hamburg in 1895, on which an exhaustive report is published. In these works, several methods of treatment were thoroughly tried on the sewage of that city. The effluent from the settling-tank was dealt with by the use of the slag from the city rubbish destructor in place of coke as the oxidizing body; and the success of this trial far exceeded expectation. The experiments proved that typical town sewage could be purified for months without the use of chemicals by the oxidation process, even in quantities equivalent to the sewage from more than 10,000 persons per acre. The purification effected was such as is only rarely attained on irrigation lands. The oxidation process proved at least as good as the septic tank process; while Professor Dunbar regards it as more rational, and in most cases less costly. For small installations, however, the septic tank system may, he thinks, be preferable under some conditions.

Loss of Water by Leakage in Paris.—According to some figures recently published in the "Revue Industrielle," there was considerable loss of water by leakage in Paris in the year 1898. The particulars are rather old, but their teaching will probably be equally good now. It appears that the daily consumption of water in that year averaged about 60¼ million gallons, whereas the quantity paid for was only about 46½ million gallons. The Municipality acknowledge that there is a difference of about 30 per cent. in the quantity of water consumed and that which is paid for.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Calorimetry of Coal Gas.

SIR,—I must thank Mr. Kühne for his admission of the correctness of my contention that Mr. Hartley invented the principle which is embodied in, and is the essence of, modern gas calorimeters—including that known as Junkers'. It was the recognition of Mr. Hartley's invention in this connection that I was anxious to establish.

Mr. Kühne goes a little farther, and leads one to examine into how much we are indebted to Herr Junkers in the matter of gas calorimeters. I, therefore, take his specification, and compare the system due to Hartley—namely, "the principle of absorbing the heat of a stream of gas products by a stream of water (the two being separated by thin walls of metal)"—with what might be termed the preamble of Herr Junkers' patent, as follows: "In calorimeters hitherto known, the quantity of heat yielded by a source is ascertained by heating a determined quantity of water or other liquid in a vessel, secured as much as possible against loss of heat; and then the increase of temperature is taken note of. In opposition to the foregoing, in the present calorimeter, the quantity of heat developed from a constant source is transmitted to a continually flowing body, such as liquid or gas. The quantity of heat of such source is then determined from the body in transit, and also from the increase in temperature which the body experiences as it passes through that part of the apparatus taking up the heat—that is, when a state of permanency has been created, wherein as much heat of the constant source is taken up by the body in transit as the source produces."

I am quite willing to believe that Herr Junkers was not aware of Mr. Hartley's work when he was responsible for the above extract. Indeed he could not have been, as Mr. Hartley's arrangement was that "water should flow over a thermometer, and thence into a case surrounding the burner, and into a metal jacket enveloping the calorimeter."

The burner was thus in the centre of a cylindrical chamber at the bottom of the instrument, and was so placed with the avowed object of avoiding loss by radiation. The gas was measured by a meter, and the issuing water tested for temperature, and the quantity passing ascertained. This system, it will be seen, was adopted eight years before Herr Junkers made the statement that no such method was known.

We, therefore, ought not to forget the fact that the principle which is the *raison d'être* of the Junkers' calorimeter, is due to Hartley.

May 31, 1900. JNO. F. SIMMANCE.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress was made with Bills on Monday last week, when the House rose for the Whitsuntide holidays:—

Bill brought from the Commons, read the first time, and referred to the Examiners: St. Albans Water Bill.

Bills reported, with amendments: Bury and District Water (Transfer) Bill, Salford Corporation Bill.

Bills read the third time and passed: Margate Corporation Bill, Westgate and Birchington Water Bill.

The Airdrie, Coatbridge, and District Water Trust Bill, and the North Warwickshire Water Bill were referred to a Select Committee, consisting of Lord Ribblesdale (Chairman), the Earl of Lichfield, Lord Clanwilliam, Lord Hylton, and Lord Hare; to meet on Wednesday, June 20.

HOUSE OF COMMONS.

The following further progress was made with Bills on Monday last week, when the House rose for the Whitsuntide holidays:—

Bill presented, read the first time, and referred to the Examiners: Perth and Paisley Gas Provisional Orders Bill.

Lords Bills read the first time, and referred to the Examiners: Margate Corporation Bill, Westgate and Birchington Water Bill.

Lords Bills read a second time and committed: Bristol Water Bill, Falkirk Corporation Bill.

Bill reported, with amendments: Local Government Provisional Orders (Gas) Bill.

Bill read the third time and passed: St. Albans Water Bill.

A Correction.—Owing to the misreading of a contraction in the shorthand writer's transcript of his notes of Mr. H. H. Jones's evidence on the Wandsworth and Putney Gas Bill, given last week (p. 1453), the meaning of one of his opening statements was obscured. What Mr. Jones said was that, "on occasions last winter, they could have sold quite half a million cubic feet more than it was possible to *manufacture*."

Ripon Gas Finances.—The Town Clerk of Ripon (Mr. M. Kirkley) has issued his report on the finances of the city for the year ending March 25. In regard to the Gas Department, it is stated that the profit on the year's working was £416; but after paying sinking fund and interest, there was a deficit of £687. There was, however, a balance in hand of £630 on capital account. The sum of £600 had been repaid on old loans, which now amounted to £1900, and £300 on new loans, of which £9700 was outstanding.

Gas and Water Profits at Barrow.—In moving the adoption of the Gas and Water Committee's report at the meeting of the Barrow Town Council yesterday week, Colonel Strongitharm said that, in spite of the adoption of electricity, there had been an increase of 437 in the number of gas consumers. The income was £29,562—an increase of £738, although the Steel Company were now using electricity instead of gas. The net profit on the gas undertaking was £5187—an increase of £205. The accounts of the Water Department were equally satisfactory; the profit being £6681, or an increase of £1581 on last year.

THE PARLIAMENTARY COMMITTEE ON MUNICIPAL TRADING.

The Joint Committee of the Houses of Lords and Commons, appointed to consider and report as to the principles which should govern the powers given by Bills and Provisional Orders to Municipal and other Local Authorities for industrial enterprise within or beyond the area of their jurisdiction, sat for the first time on the 22nd ult., under the presidency of the Earl of Crewe, for the purpose of taking evidence. The names of the members of the Committee have already been given (*ante*, p. 1354).

The first witness called was Sir Courtenay Boyle, Permanent Secretary of the Board of Trade; his evidence relating to the various channels of municipal enterprise. He said it was safe to regard water, gas, and tramway undertakings as monopolies; but electric lighting had been treated differently. The Act of 1888 contemplated competition in electric lighting, and the practice of the Board of Trade was to allow competition between two undertakers in each area. From a return which had been made, he found that in England and Wales there were 173 water undertakings carried on by municipal authorities, and 53 in Scotland. In the case of water, municipalities must go outside their areas to get water; and therefore it seemed to him arguable that they should be allowed to supply water outside their districts. At present, without the special sanction of Parliament, a municipal authority could not supply gas outside their limits, or compete with an existing company within their district. Sometimes a corporation bought an undertaking supplying gas outside their district, and this necessarily implied that if they purchased they might continue that supply. In cases of purchase, a maximum price for gas was generally fixed. Apart from the supply of gas, there were certain things which came within the category of trading. One of these was dealing in residual products, which were an important factor in determining the price at which gas could be sold. When a corporation took to supplying burners and artistic gas-lamps, it went a little further. The Board of Trade were chary about sanctioning the sale of fittings, and still more so about their manufacture by municipal bodies. In the United Kingdom there were 222 authorized gas undertakings belonging to municipal bodies, which yielded a gross profit of £1,181,675—equivalent to 6·3 per cent. on the capital employed; while the profits on the 439 undertakings belonging to companies were equivalent to 7 per cent. on the capital expended. This seemed to show that municipalities were inclined to pay rather less regard to profits than were the companies. The general policy of Parliament had been not to authorize competition between a local authority and a going authorized gas undertaking; but there was no objection, as a rule, taken to the purchase of gas undertakings by municipalities. As to electric lighting, about 300 authorities owned their own electric light undertakings. The electric lighting legislation of 1882 was held to be defective inasmuch as it only granted 21 years to companies before their undertakings became purchasable by the local authorities; and the Act of 1888 extended the period to 42 years. No allowance was made for goodwill in the purchase of these undertakings; but it was generally otherwise in the case of gas-works. Electric supply outside the district of a local authority was effected either by directly permitting the authority to go beyond their area or by a transfer of powers granted to bodies outside. There were instances in which Parliament had authorized the supply of electricity in bulk outside the district; but, as a rule, the Board of Trade tried to confine concessionaires to a particular geographical area, though this need not necessarily be conterminous with the area of the local authority. He knew of no instance where a forcible transfer had been permitted. The grant to a local authority of power to supply outside their district naturally made that authority a trading body in the outside area. If they lost, the municipal ratepayers lost to benefit the outside district; if they gained, the municipal ratepayers gained at the cost of the outside authority. As to whether it was a right policy he could offer no opinion. It would be rather difficult to have a sliding-scale. Application had been made for power to supply electric light fittings; but the Board of Trade had always objected to corporations being allowed to make or sell these articles. If their supply was necessarily incidental to that of electricity, it might be permitted, but not otherwise. For instance, the provision of a good supply meter (when one was found) might well be entrusted to corporations, but not burners and things of that kind. The wiring of houses for electric lighting had never been handed over to corporations. The thing supplied was electric energy, which might be employed for lighting, motive power, or any other purpose. Its use was unlimited by statute or otherwise. Coming to tramways, witness said there had been a distinct progress in the policy of Parliament with regard to the ownership and working of them. Tramways had been owned by municipalities since 1868; but their working by these bodies had grown up comparatively recently. The Standing Orders had been gradually altered to allow this. It was a matter well worth the consideration of the Committee whether it would not be better, in the case of outside districts, that the tramways should be owned by a Joint Board rather than that a municipality should trade as a company outside their area. The invention of electric traction would certainly affect this question, because with it the tendency would grow to construct tramways of greater length. Municipal tramways generally had been fairly lucrative, and applications for leave to work them were increasing year by year. Asked to give instances of novel power being asked for by local authorities, witness mentioned, among others, applications for powers to provide apparatus for games and recreations and to charge for the use thereof, to provide games for the use of the public, to maintain refrigerators and cold-air cells, to provide bathing tents, and to provide Turkish baths. The London County Council applied for special power in 1895 to establish workshops in which to make the clothing and boots required by the Council. He had also seen an advertisement by a corporation to the effect that they were prepared to accept sums of money on deposit. The Board of Trade were not, he thought, concerned in the novelty of the powers asked for; this being a matter almost entirely for Parliament. They were, however, very much concerned in knowing what Parliament thought should be done. As a Department entrusted with the granting of Provisional Orders, they must look to Parliament for guidance. He wished to pay a tribute to the excellence of the management of their affairs by municipalities, as there were many instances of economical, wise, and effective administration.

His point was that when they went to trade outside their own districts Parliament should consider on what principles, and under what limitations and terms of organization, they should go. This was, he thought, broadly, the whole of the difficulty.

At the second meeting of the Committee, which took place on the 25th ult., Mr. Albert Gray, Counsel to the Chairman of Committees of the House of Lords, gave some interesting evidence. Dealing first with gas supply, he related a fact in regard to gas-fittings which was found in the first Private Gas Act introduced, and which, he said, had a bearing on municipal trading. The Act referred to was that of the Gaslight and Coke Company, introduced in 1810, which contained a provision expressly forbidding the Company to furnish or sell any stove, pipe, or machinery of any kind for conveying gas into buildings. In a subsequent Act of 1816, there was a clause, not only forbidding the Company from selling fittings, but also from employing workmen to fix in any building fittings for the supply of gas. This, it would appear, was to prevent the establishment of a monopoly for all purposes. After some years, this became inconvenient, and power was given to companies to supply fittings. When, in the sixties, gas undertakings began to be acquired by local authorities, they took them over with all the powers possessed by the companies, including those to provide, and also, he believed, to manufacture, gas-fittings. A typical instance occurred in 1879, in the case of Stratford-on-Avon, the Corporation of which took over a private gas undertaking, and power was given to "manufacture, sell, provide, supply, and deal in" meters, fittings, pipes, &c. The term "fittings" would embrace a chandelier such as the one hanging in the Committee-room. As Sir Courtenay Boyle had stated, the power to manufacture and supply fittings had been taken out of Bills during the last two sessions, and a clause had been inserted expressly stating that the powers should not include the powers to manufacture and supply fittings. The clause was also inserted in the companies' Acts, so that, in the event of the undertakings passing into the hands of the local authorities, these powers shall not be exercised. Asked whether he had anything to say as to the working of gas undertakings by municipalities outside their own area, witness said he had no observations to offer, but should like to remark in regard to water supply that powers were sometimes applied for extending over a larger field than was necessarily covered by gas, and it was a matter for consideration whether a combination of small local authorities might not be an advantageous way out of the difficulty. He cited the case of the South Essex Water Board, recently referred to in the "JOURNAL." Two Bills affecting a number of districts in South Essex came before Parliament—one promoted by a combination of Local Authorities, who proposed to go for their supply 20 miles out of the district, and the other by the local Water Company, who wanted to go 40 miles off. Witness suggested whether it was desirable that a number of small Local Authorities should attempt to carry on a large undertaking involving a considerable amount of travelling to go to the place of meeting. This difficulty, he said, seemed to have occurred to the promoters of the Water Board, because the Bill contained a clause dealing with the qualifications of members, which stated that a person could not be elected to the Board unless he was, or had been, a member of one of the constituent Local Authorities. This difficulty, he pointed out, did not apply to the great municipalities. Not only had they a greater number of members to draw from, but also larger funds. They were in a position to keep a first-class staff, and to carry on the undertaking in a thorough manner. In support of his contention, witness referred to the formation of the Derwent Valley Water Board, composed of representatives of several great Municipalities, to take and distribute water from the Derwent. With regard to electric lighting, the power to supply outside a local authority's district had been given ever since the passing of the Electric Lighting Act of 1882. If a local authority were in possession of electric lighting plant, they might compel a company to take electric energy from it. This, of course, meant a saving; and there was no reason why there should be a double electric plant in a town where one would do. It might be that the local authority would then be more likely to purchase the company's undertaking. The power to manufacture electric light fittings had recently been struck out of Electric Lighting Bills also. The veto which a local authority had over a tramway scheme promoted by a company appeared to him at the present day to work very badly. He thought it was the intention of Parliament that the consent of the local authority should be what might be called a "clean" consent. There had, however, unfortunately sprung up a practice of demanding conditions; and in some cases a demand was made that the local authority should share the profits of the undertaking during the term of the company's tenure. It was obvious that when such a demand was made, a company was in a cleft stick. Tramway companies were sometimes compelled to allow the use of their electric wire poles for lighting, for sewer ventilation, and for advertisements. One Tramways Bill, introduced in the present session, contained a clause providing that free passes over the tramways should be given to officials of the Corporation; but it was struck out. Another provided that a Tramway Company should pay the Corporation, as an annual rent for the use of the streets, £10 a year per mile for ten years, and £20 per mile in subsequent years. Asked if the Chairman of Committees would consider it an unfair condition, and strike it out of an Electric Tramway Bill, if a corporation required the promoters to take their electricity from the municipal generating station, witness said he would not consider that an "unfair" requirement.

The Committee then adjourned till after the Whitsuntide holidays.

HOUSE OF COMMONS COMMITTEE.

Thursday, May 10.

(*Before Colonel* GUNTER, *Chairman*, SIR GEORGE PILKINGTON, *Sir* W. HORNBY, *and Sir* W. B. GURDON.)

EAST LONDON WATER BILL.

This was a Bill to obtain authority to build additional reservoirs and to raise further capital.

Mr. PEMBER, Q.C., Mr. CLAUDE BAGGALLAY, Q.C., Mr. TALBOT, and Mr. GULLY appeared for the promoters. Lord ROBERT CECIL, Q.C., and the Hon. SIDNEY HOLLAND represented the Hertfordshire County Council; Mr. E. MORTEN, the West Ham Corporation; Mr. J. E. EARLE, the Middlesex County Council; Mr. BALFOUR BROWNE, Q.C., and Mr. SQUAREY, Messrs. Ridley, Whitley, and Co.; Mr. BALFOUR BROWNE, Q.C., Mr. WORSLEY TAYLOR, Q.C., and Mr. FREEMAN, Q.C., the London County Council; and there were other petitioners not appearing by Counsel.

Mr. PEMBER, in opening the case, said the Bill was the same as that passed by the House of Commons last year, but which was afterwards, somewhat to the surprise of most people, thrown out by a Committee of the House of Lords. By various Acts up to 1897, many additions had been made to the capital of the Company, mainly with a view to the improvement of their storage accommodation, which was, he would say, in an unduly scanty condition. In 1898, the Company had been obliged to stop the continuous supply; and in 1899, they had to obtain water from other Companies. The proposed new reservoirs were to be at Chingford, and there were at present two in course of construction at Walthamstow. It was with the full knowledge that the Company purposed making these reservoirs, that Lord Balfour of Burleigh's Commission reported that, in their opinion, the Rivers Thames and Lea would afford enough water to supply London to 1931, and that of this supply the Lea could be relied upon to yield 52½ million gallons. He need not go into the question of the supply in 1895 and 1896; and in view of the reservoirs not being completed last year, there would have been another failure, but for the fact that, by the operation of Mr. Chaplin's Act, they had been able to get assistance from their neighbours. The storage of the Company had certainly in the past been too small. In 1892, their storage was only 610 million gallons. The Bill of 1893 was to enable the Company to remedy this deficiency, and to construct the first of the new reservoirs to which Mr. Bryan, their Engineer, drew attention before Lord Balfour's Commission. The Bill was in that year rejected; but the following year they again promoted it, when it passed the second reading, though only by a majority of one. That Bill raised the storage from 610 to 1200 million gallons; and by the Bill of 1897—which was a further instalment—the storage was raised to 2400 million gallons. Under the present Bill, the Company expected to get an additional 5300 or 5500 million gallons, which would give them reservoirs of a storage capacity of some 7500 or 7700 million gallons. This would complete Mr. Bryan's original scheme, as put by him before the Royal Commission of 1891. The estimated outlay was £1,338,000, which, owing to the increased cost of labour and materials, was rather higher than last year. The scheme was based on a supply of 35 gallons per head per day to the present consumers, and a decennial increase of 18·2 per cent. of the population. These were the figures which, after some debate, had been adopted by Lord Balfour and his colleagues. Looking forward to the year 1931, the Commission estimated the total need of London at 420 million gallons a day. He thought they might hope that, when the projected reservoirs were finished, the East London population would be free from the fear of scanty water supply for at least twenty years to come. The East London Company's was in the main a Lea supply; though they had power to take 10 million gallons daily from the Thames. The second object of the Bill was to make provision for a temporary supply. The gist of their clauses was that, from time to time, with the consent of the Local Government Board and the Thames Conservators, they might take, in case of emergency, either from their own intake or from the intake of any other Company, more water than they were able to draw now on any one day, provided that the whole amount taken in any half year should not exceed a daily average of 10 million gallons. For this privilege, they are from the first to pay the Conservators at the rate of £1000 a year.

Mr. *W. B. Bryan*, examined by Mr. BAGGALLAY, said he had been for eighteen years the Chief Engineer of the Company. The Company supplied 53,560 acres out of the 85,692 acres which was their statutory district. The New River Company and the South Essex Company also supplied within their area. The total population within their limit of supply was now about 1,352,000. The increase of supply had been almost entirely in Essex, which was due largely to the facilities offered by the Great Eastern Railway Company. Their principal source of supply was the River Lea. They had the power, and they exercised it, of taking water from the River Thames; and their third source was wells and gravel springs. Roundly, they took 30 million gallons a day from the Lea; and they drew possibly 8 million gallons from the Thames. From the wells they obtained a very variable supply. They did not pump any water at all during the times of floods in the Valley of the Lea, but allowed the chalk to become thoroughly saturated, so that when they had to pump they would be able to draw upon their underground supplies. Practically all their storage was at Walthamstow. The reservoirs authorized by the Act of 1897 were not yet completed; and it would be quite two years before they were available. In 1890, he prepared a scheme which he laid before Lord Balfour of Burleigh's Commission, with regard to the provision of storage in the Lea Valley, by which he proposed to provide reservoirs to hold 7130 million gallons. In 1893, they promoted the first Bill to give effect to the scheme; and the present one was the completion. In 1898, his attention was called to the deficient storage, by their having been compelled to put the districts on an intermittent supply, because their storage was depleted. They had some wells now in progress. When these were completed, they would be able to get from the River Lea 37½ million gallons a day, from the River Thames 10 millions, from the wells 20 millions, and from the gravel springs at Hanworth about 2 millions. This would give a total of 69·4 million gallons a day, from which a deduction of 5·4 million gallons had to be made for the purposes of the River Lea navigation. Substantially, they had about 64 million gallons of water available, if they had the storage to utilize it. He based their wants on 35 gallons per head per day for a population of 1,830,000, which they estimated would be the population to be supplied at the end of 20 years. This amount was taken as the public requirements by all the London Companies. As to the population, that was based on the figure of 18·2 per cent. as the decennial increase, which was adopted by Lord Balfour's Commission. To give this supply, 64 million gallons a day would be necessary, to provide which they would require a storage of 77·4 million gallons. To meet the needs of the district, it would be necessary to construct the final instalment of his original scheme. The reservoirs at Walthamstow were not yet completed. The new reservoirs to be constructed under this Bill would be immediately north of

the Company's Chingford pumping-station, and would be partly in the county of Middlesex and partly in the county of Essex. The area of the two would be 846 acres, and the capacity 5300 million gallons. This would give them slightly more storage than they required; but they always had a certain quantity of bottom water which it was not advisable to use. To enable them to carry out the work, they would have to make a diversion of the River Lea. The channel would be to the east of the reservoirs. The cost of the works would be £1,338,000—rather higher than would have been the case last year. This was due to the increased cost of labour and materials. The capital proposed by the Bill was £1,800,000.

The CHAIRMAN asked how it was proposed to raise the money.

Mr. BAGGALLAY said by the issue of debenture stock, which would be sold under the auction clauses, and would be redeemable at par at any time after 25 years. The interest would be 3 per cent.

Witness (continuing) said besides the construction of the reservoirs, they would require money for engine power and machinery. They estimated the cost of this at £100,000, and of mains and services £200,000. The last item would be spread over about twenty years. These sums were all allocated by clause 44 of the Bill, leaving about £160,000 not specifically "ear-marked." This would be available for contingencies, or for any further buildings and machinery which might be required.

The CHAIRMAN inquired if it would be available for sinking wells.

Witness said the money would be available for all the purposes of the Company. In the construction of the new works, they had been obliged to take 180 acres of Lammas lands. The Company proposed, in exchange, to provide 5 acres of land at Waltham Cross and 5 acres at Chingford, which would be converted into public playgrounds. Under the Bill, they proposed to impound the water of the river when it was high, and to store it so as to supply the flow in time of drought. He had no doubt of the efficiency of his scheme, which he had presented to Lord Balfour's Commission. As to the portion of the Bill dealing with the temporary supply, the Company would only use the powers with the consent of the Local Government Board and of the Thames Conservators. They had arranged to get assistance from other Companies; but in time of drought, the Companies who would help them might themselves be without a surplus. They asked to be able, in times of emergency, to take by themselves, or through other Companies, a temporary extra supply from the River Thames. The amount thus taken was to be limited to a maximum of 30 million gallons a day, and a maximum amount within the half year of a daily average of 10 million gallons. In 1898 and 1899, the Company were obliged to seek assistance from other Companies; and in 1898, they had to get the Southwark and Vauxhall Company to break an express enactment, so as to save the East-end from a water famine.

Friday, May 11.

Mr. *Bryan* was to-day further examined by Mr. BAGGALLAY. Witness was first asked as to the amount of water the Company were able to furnish in the summer of 1898. He said in June of that year they supplied 42½ million gallons daily; and in July, 45 million gallons daily. In August, they gave a constant supply up to the 22nd of the month, and afterwards an intermittent one. Up to the 22nd, the quantity was 43 million gallons daily; and after that date, 42½ millions. As to the sources of their supply, they got from the Lea 9½ million gallons in July, 1 million gallons in September, and 4·6 million gallons in October. From the Thames and their wells, they obtained 17 million gallons in July, 19 million gallons in August, 19 million gallons in September, and 18½ million gallons in October. From their storage reservoirs they obtained 17½ million gallons in July, 9,900,000 gallons in August, 4·6 million gallons in September, and in October their storage was exhausted. In July, they had to obtain assistance, and got 1 million gallons from the New River Company. In August, they obtained 5,600,000 gallons a day; and in September, 6,129,000 gallons. In September, they received assistance also from the Southwark and Vauxhall Company and the Kent Company. They took water from other Companies long before they gave the intermittent supply, so as to keep the storage as large as they could. They took, indeed, all the New River Company could spare. In September, the Southwark and Vauxhall Company gave them 5,200,000 gallons, and the Kent Company 200,000 gallons. The Southwark and Vauxhall Company had to lay a pipe to help them. Their storage reservoirs, which had been full on June 20, were empty by the end of September. During September, they gave a daily supply of 25 gallons of water per head, 18 gallons of which was a purely domestic supply. If the consumers had had cisterns, the effect of the drought would have been greatly minimized. The provision of domestic cisterns was one of the recommendations in the report of Lord Llandaff's Commission. The Company consulted Mr. Mansergh, Mr. Eaton, and Mr. Hill; and they all agreed that the best plan of meeting the difficulty was to carry out the scheme which he had proposed to Lord Balfour's Commission. Last year they gave a continuous supply, and at a very high pressure; but to do so, they had to obtain assistance, under Mr. Chaplin's Act, from the other Companies. Regarding their position, they had thought it desirable to take only seven years for the construction of both their new reservoirs. In his view, what they were now doing was in accordance with the recommendations of Lord Balfour's and Lord Llandaff's Commissions. The proposal to take the water from the Thames on a six months' average was exactly that suggested by Lord Llandaff's Commission, who recommended that the water should be drawn when the river was in flood, when the storage reservoirs could be filled without affecting the flow. As to the opposition of Messrs. Ridley, Whitley, and Co., they did not object to the Bill last year when the proposals were the same. The East London Company were the owners of the whole river bed, which they purchased from the Ecclesiastical Commissioners some years ago; and since 1867, they had diverted the water above the Chingford Mill (which they bought), and carried it to their Walthamstow reservoirs.

Cross-examined by Lord R. CECIL: At the present time, the Company had no capital available for new works. Of the new capital proposed to be raised, a sum of £160,000 would be available for the general purposes of the Company. They did not propose to sink any new wells; but he could not pledge himself that none should be made.

Witness was afterwards cross-examined by Counsel on behalf of other petitioners against the Bill.

Monday, May 14.

Sir *Frederick Bramwell*, examined by Mr. TALBOT, said he had given great attention to the London Water Supply. In his opinion, the proposed new works were necessary for two reasons—first, on account of the enormous increase in the population to be supplied exterior to London; and, secondly, on account of the consecutive droughts lately experienced. These droughts were unprecedented, and had led to the revision of conclusions that were formerly accepted by water engineers. He was familiar with the sources from which the Company obtained their supplies. These were the Lea, the Thames, the gravel beds bordering on the Thames, and the wells in the chalk. The flow of the River Lea varied considerably, not only in the different seasons, but in different years; and it had varied in the way of diminution for a number of consecutive years.

The CHAIRMAN; If I follow you, you mean that at one period of the year a very heavy flow comes down into the Lea, and at other times it is much less?

Witness: Yes.

Therefore, I presume, your view would be that they should be able to take water when there is a flush of it?—That is so; the obvious way of dealing with the waters of a river which does not flow with regularity is to impound the water which otherwise would uselessly flow into the sea, for the purpose of dealing it out in the times of short water from the storage which has then been provided. That is a truism as regards dealing with the supply of almost any river.

In further examination, witness said at times of full river a great deal of water ran to waste by Blackwall, which was the natural outlet of the River Lea. In his opinion, the method proposed in the Bill was a sound one; and it was the principle recognized in the reports of Lord Balfour's and Lord Llandaff's Commissions. The present scheme was just doing for the Lea what the Staines reservoirs were doing for the Thames—affording a means of impounding the surplus water. Assuming that the water of the Lea was to be used for the supply of London, he knew no more suitable or economical plan of carrying out this object than what was proposed in the present Bill. As to the petition of the Hertfordshire County Council, he understood they objected to the taking of underground water which might injure the flow of the rivers. The provision of increased storage would have the effect of relieving the Company from the necessity of drawing on the wells. But the pumping of the East London Company was in every case from under a thick bed of impermeable clay; and he could not understand how this could in any way deplete the surface waters of the Lea. In his opinion, the distant supply of water would not come so long as the Thames and the Lea could supply London; and therefore the alternative of storage only remained, and this was the object of the Bill.

The CHAIRMAN asked witness whether, in the event of the water supply being taken over by a Board or Chamber, the fact of having their reservoirs sanctioned would in any way trouble the authority.

Witness: I cannot see the possibility of it. I am assuming that Parliament and the public have determined to put off until needed any distant source of supply. If that be so, we are left with the alternative of storage. I know, and can conceive of, no better means of storing the Lea water than what is the subject of the Bill; and I am perfectly certain that the carrying out of these works would simply be anticipating that which any prudent authority in charge of the district would be compelled to do. Continuing, witness said in 1950 it was said they would need both the Welsh, or distant supply, and what the rivers Thames and Lea could give as well; and in that case all the works they proposed on the Lea would be used.

Mr. *James Mansergh*, examined by Mr. GULLY, said he had had forty years' experience in the design and construction of water-works. He was a member of the Commission presided over by Lord Balfour of Burleigh. He was fully acquainted with the works of the East London Company. In 1892, Mr. Bryan laid before the Commission his scheme of reservoirs, which was practically the one proposed in the present Bill. The Commission were fully satisfied with his plan. Some of the reservoirs, as designed by Mr. Bryan and presented to the Commission in 1892, would have been made by instalments; but the drought of the last five years had shown that they should be commenced at once, and finished as soon as possible. The demand was more urgent than in 1892. He had visited the site of the reservoirs, and generally approved the plans. They were very easily constructed reservoirs. A trench would be dug all round, through the gravel overlying the clay; and a puddle wall would be tied down into the clay, so as to complete the water-tight basin, and then the puddle wall would be carried up, and supported by banks on each side in the usual way. There were no heavy or difficult works. He had looked at the estimates, which were fair at the present time. In his opinion, it would be the greatest folly to abandon the Lea. If London continued to grow the next 50 or 60 years as it had done in the past, not only would the whole of the water that could be drawn from the Thames and the Lea and the chalk be needed, but also what could be obtained from the Welsh scheme of Sir Alexander Binnie. Both of these services would be required; but before they went elsewhere, he felt very strongly that the Thames and the Lea should be fully exhausted. The Welsh works, including the reservoirs and the aqueduct, could not be completed in less than twelve or fifteen years. He was carrying out a scheme for the Birmingham Corporation, with an aqueduct 80 miles in length; and though they got their Act in 1892, they would barely complete the works in 1902. The aqueduct for London would be over twice as long; and the difficulties would be very great. Whether the Companies continued to administer the water-works of London or not, the works proposed in the Bill must be carried out, because the water from these sources would ultimately be required. As to the quantity of water, the Balfour Commission decided that from the Thames, the Lea, and the chalk there would be an ample supply till 1931. The Commission of Lord Llandaff, with the advantage of having the Welsh scheme before them, had extended this period by ten years, to 1941. But this, of course, was largely a question of storage. He himself was strongly in favour of getting water from mountain streams; but although he might think it an excellent thing to secure pure mountain water, it would be great folly not to utilize every drop in the Lea. Before the end of the century, all the water from these sources, and from the scheme designed by Sir Alexander Binnie, would

be exhausted. He had no doubt about that. Where they would have to go after that, he could not say.

Sir G. PILKINGTON: I understood that the Welsh scheme would provide almost as much as you liked to take?

Witness: Oh, dear, no; there is a limit. When we were fighting the Birmingham scheme, I took the trouble to investigate the whole of these Welsh mountains, right away from Rhyl on the north to Glamorganshire on the south; and I made out that, in addition to what we were taking for Birmingham, there might be obtained for London 400 million gallons a day. This is not an inexhaustible quantity. The area is limited, the rainfall is limited, and the facilities for making reservoirs are limited.

The rainfall is heavy I suppose?—The rainfall is, of course, heavier than here. It is an average of perhaps 65 or 66 inches, against less than half that quantity here; but you must not go away with the idea that it is an inexhaustible source of supply. There are a good many other authorities already tapping the Welsh supplies. Still, I think the Welsh mountains are the next place to go to for London. I quite agree with Sir Alexander Binnie about that.

Mr. *G. H. Hill*, examined by Mr. BAGGALLAY, said he was a member of the Royal Commission in 1893 on the Metropolitan Water Supply. He was well acquainted with the East London system, and agreed that the present proposal was the final instalment of the scheme which had been submitted by Mr. Bryan to the Balfour Commission. No circumstances had arisen since 1893 to necessitate any modification of the scheme as submitted to, and approved by, the Balfour Commission; the only point was that the experience of the last two or three years showed most distinctly that no time ought to be lost in the construction of the works. In the case of Manchester, it was very likely the Corporation would not have been allowed to go to Thirlmere, if they had not been able to show that they had practically utilized nearly the whole of the water in the Langley Dale district. Parliament was very strong upon the point that if it handed over a particular district to any water authority, it required that the district should be fully utilized before they went into a new area. In October, 1898, he, with Mr. Mansergh and Mr. Eaton, was consulted by Mr. Bryan as to the steps the Company should take to provide against a repetition of the drought they had just gone through. They concurred in recommending the adoption of the scheme which was introduced last session. This scheme, taken with the 10 million gallons a day which the Company could draw from the Thames, and 2 million gallons from the gravel beds at Hanworth, would give a daily supply of 64 million gallons, which would satisfy the needs of East London for the next twenty years. The proposed new reservoirs would contain 5300 million gallons, and the existing and authorized reservoirs 2200 million gallons. The total storage would thus be 7500 million gallons. There was ample water to fill, and keep filled, these reservoirs. In the last eighteen years, the average daily flow of the River Lea at Feilde's Weir had been at the rate of 98¼ million gallons a day; so that, as far as quantity went, there was plenty of water. The great advantage of a scheme such as was proposed, was that they could take the water when there was plenty, and use it in times of drought.

Replying to the CHAIRMAN, witness said, in his opinion, the two new reservoirs would be absolutely necessary, whoever supplied London with water. In 1898 and 1899, during the water famine, the Company were assisted by other Companies; but it was quite possible that, in a very dry year, these Companies would require the water for their own districts, and would have no surplus.

Mr. *E. M. Eaton*, examined by Mr. GULLY, said he was acquainted with the works of the East London Company, and nearly the whole course of the Lea. Having regard to the increased population, the proposed new reservoirs were absolutely necessary, if the Company were to fulfil their statutory obligations. He had made a calculation of the water that came down the Lea between August, 1897, and December, 1898—a period of 17 months. During this time, the excess quantity passing down the Lea beyond what the New River Company had power to take was 23¼ million gallons a day. Beyond this, there would be required for the purposes of the East London district a further amount of 14¼ million gallons, which the new reservoirs were intended to supply. The scheme proposed in the Bill was a perfectly proper one; and he saw no reason to modify either the reasoning or the calculations which were come to in designing the reservoirs.

Mr. *R. A. Middleton*, examined by Mr. GULLY, said he was one of the Engineers of the Staines reservoirs and was Assistant Commissioner to the Royal Commission presided over by Lord Balfour of Burleigh. On that occasion, he carried out an extensive examination of the rivers, streams, springs, and wells, with a view to see how they were affected by pumping. The result of pumping above the pumping-station was *nil*. Below the pumping-station, the quantity of water taken out at that station must go to deplete the volume of the underground flow or trend of the water in the chalk; but this was spread over such a large area, that it was very small in effect. In his opinion, any decrease in the flow of the streams or the wells was due to a deficiency of rainfall, and not to the effects of pumping.

Mr. *W. Hunt*, of Snaresbrook, examined by Mr. TALBOT, said he was well acquainted with the River Lea. He first went to Chingford Mill, and left there in 1882. All the water which passed the mill went to the East London Company's reservoirs; and that he used rejoined the river about a mile lower down, and one-third of a mile below the works of Ridley, Whitley, and Co. He kept all the water he could in his own hands, and never heard that Messrs. Ridley, Whitley, and Co. had any right in it.

Mr. SQUAREY said that, in view of the fact that his clients were trying to arrange terms with the Company, he would not cross-examine witness on the question of the water-rights.

This was the case for the promoters; and evidence was then called on behalf of the Hertfordshire County Council.

Mr. *U. A. Smith*, examined by Mr. SYDNEY HOLLAND, said he was Engineering Adviser to the Hertfordshire County Council. He knew the wells existing in the Lea Valley. These were the wells belonging to the East London Company, to the New River Company, to private individuals, and to the local Water Company. Almost everybody who wanted a well came to the Lea Valley; and the County Council feared that the money raised under the Bill would be expended in the sinking of new wells. In his opinion, if more wells were dug, the water levels in the county would be further lowered, and the flow of the streams reduced. The Balfour Commission had reported that 57 million gallons was the limit of the quantity which could be safely taken from the Lea Valley; and of this, 40 million gallons was allocated to the New River Company and the East London Company. At the present time, the pumping capacity of the two Companies was 68 million gallons a day.

Witness handed in a table of the quantity of water pumped by the two Companies in the Lea Valley during July, August, and September, in each year from 1881 to 1889. Up to 1889, the pumping was under 10 million gallons a day; but in 1899, the figure had risen to 37·21 million gallons, which was dangerously near the limit of 40 million gallons.

The CHAIRMAN: Then you are, I presume, strongly in favour of the Companies taking surplus water, when there is an abundance in the river, into storage?

Witness: Exactly; and the more they take, the better.

Therefore you are in favour of having these reservoirs made?—Quite so. In fact, we should prefer that the reservoirs were even larger.

Mr. BAGGALLAY cross-examined witness at considerable length, with the object of proving that the diminution in the flow of the streams was due to the low rainfall, and not to the sinking of the wells.

Mr. HOLLAND then addressed the Committee on behalf of the County Council of Hertfordshire. He said the Council appeared there because they seriously believed that the effect of the great increase of pumping in Hertfordshire was depleting their wells and lowering their streams. Mr. Baggallay, in one of his questions, had said the effect of the proposed new reservoirs would be to render unnecessary the making of new wells. If so, the Council welcomed the scheme; and they only opposed the Bill because they considered that, as the finance clause was at present, any surplus funds which could be devoted to any purposes of the Company might be expended in the sinking of wells. They felt very strongly that, when the Company went to Parliament for these large powers to build reservoirs, it was fair to say to them: "Build your reservoirs so large that you will not require any further wells." There was another clause in the Bill to which they strongly objected—the power to supply water in bulk to other authorities outside their district. He suggested that the clause was only put in to get a very valuable asset for the Company in case the undertaking was bought up by a Water Board, or even if such a disaster should occur as that they should be bought by the London County Council, which everybody would lament. It seemed extraordinary that the Company should, in one breath, talk about the difficulty of supplying water, and in another breath want to supply a lot of people outside their area. In view of the district, and the number of the population in it, he could safely leave that to the Committee. There was one other point. There was the greatest difficulty in getting a proper record of the wells; and he claimed that the County Council should have the right to ask for these records. The Balfour Commission had distinctly recommended that obligations should be laid upon any Company or Local Authority pumping water from the chalk, to keep accurate observation of the effect of their operations on the level of the water in the wells from which they pumped. Lord Llandaff's Commission concurred in the suggestion; and they asked that the Committee should have access to these records.

The CHAIRMAN: You are asking this Committee to make a precedent.

Mr. HOLLAND said he was only urging them to carry out the recommendation of the Royal Commission. He could not put it higher than that.

Mr. BALFOUR BROWNE followed on behalf of the London County Council. The Bill, he said, was in two parts. They proposed to have the means of giving a temporary supply. He hoped to show that this was entirely unnecessary. Secondly, they took power to make these large reservoirs, which were intended for a permanent supply. He hoped to show that the Committee should not give the Company the power they sought, because at the present time purchase had been recommended, and would inevitably take place. What was proposed was, he urged, an extravagant way of providing water, and it would have to be done at an extravagant cost out of the pockets of all the consumers of water in London. The temporary supply was provided for by Mr. Chaplin's Act of 1899. If the Company were bought up to-day, it would be as a defaulting Company—as a Company who in the past had to have their supplies supplemented from other Companies' resources. He did not believe that the question of purchase could be long postponed. The Llandaff Commission certainly reported against purchase by the London County Council; but they did report in favour of purchase, and whether the purchase was carried out by a Board created by a Government Bill or not, he felt sure that in a few years the undertakings of the Water Companies would pass into the hands of a municipal authority. What was the position of the East London Company? They had not got the water, because they were now asking for it. They could secure a temporary supply under the Government Bill; but this would not enhance their value. Notwithstanding this, they were seeking powers which they knew would increase the value of their undertaking. If there was any inconvenience owing to the scarcity of water, the London County Council would be the last people to try to get the Bill rejected; but he hoped to prove to the Committee that the Companies, taken all together, had enough to supply for some years to come without the present scheme. As to permanent supply, he admitted fully that if the East London Company had to exist for all time as a separate Company some such scheme as was proposed might be necessary. If they remained alone, they would require more storage; but if, as he contended, they were to be bought up by a public body or a Water Commission, or (which was still possible) by the London County Council, these reservoirs were absolutely unnecessary. Then the Commission reported that the provision of storage on the Lea was at least six times as expensive as on the Thames, and that the purchaser of the eight Companies would do the work cheaper. He asked the Committee to say that the temporary supply was unnecessary, because the Government Bill met it; and the permanent supply was unnecessary, because it would prejudice the great question of the water supply of London.

Before the evidence on behalf of the County Council was taken,

Mr. MORTEN addressed the Committee for the Corporation of West Ham. He urged that, in view of the probable purchase by a Water Board, a clause should be introduced into the Bill, similar to clause 3 of Mr. Chaplin's Bill, to prevent any enhanced value being given to the undertaking if the Committee allowed the Company the powers they sought.

Tuesday, May 15.

Mr. *W. H. Dickinson*, examined by Mr. FREEMAN, said he was Chairman of the London County Council, and had been for nine years Chairman of the Water Committee. The opinion of the Council had for some time been that the undertakings of the eight Water Companies should be purchased by some public authority. The subject of purchase by the County Council had been introduced partly by pressure brought upon them by the representatives of the East London district. The question of the East London supply was the most important, because of the fact that the Company had nearly drained the Lea dry. In 1890, the Water Committee inquired into the whole question, and came to the conclusion that the Companies had very nearly reached their daily limits. They applied to the Government to hold an inquiry; and the result was Lord Balfour's Commission. Witness detailed the various Bills which had been introduced by the Council to deal with the water question. The Council were still of opinion that the water supply should be in the hands of a public authority; that arrangements should be made for an additional supply; and that such supply should not be drawn from the Thames and the Lea. Lord Balfour's Commission reported that, whereas London now required 200 million gallons a day, in thirty years from now 400 million gallons would be needed. The question arose whether these extra 200 million gallons could be supplied; and the Committee thought it would be wiser to go to a wider source. With this view, the Council promoted the scheme for a Welsh supply. The Council were unanimously in favour of purchase. Some of the members, however, considered that such purchase should be by a Joint Board, though the majority thought it should be by the Council. The policy of purchase had been supported by Lord Llandaff's Commission. He was acquainted with the Bill, which provided for largely increased storage in the Lea Valley. In his view, these reservoirs would not be provided if the water supply was in the hands of a public authority. The method proposed by the Bill was an extravagant one, in view of the fact that the whole supply would at some future time be in the hands of a central authority. There was no risk to the East-end if the present project was not carried out. The Company's authorized works would not be completed for two years; and last year, which was a season of drought, they had been able, with the aid of the other Companies, to give a supply without difficulty. He objected to the reservoirs being sanctioned, on the ground that they were premature in view of purchase being imminent. The only result would be to largely increase the value of the undertaking when it was purchased. If the Committee granted to the Company the powers to construct these new works, he thought the same clauses should be put in which were inserted in the Staines Reservoirs Bill—a proper sinking fund clause and a sterilization clause.

In cross-examination by Mr. PEMBER, witness admitted that the responsibility of supplying the district was vested in the East London Company.

In reply to the CHAIRMAN, witness said his reasons for being there was to protect the public against any enhancing of the value of the Companies when they came to be bought. The new body who took over the water supply should have the freest hand as to where the necessary storage should be.

Mr. PEMBER intimated that his clients had been able to arrange with Messrs. Ridley, Whitley, and Co.

Lord R. CECIL said that, as the promoters had agreed to modify their proposals, he would not, on behalf of the Hertfordshire County Council, oppose the Bill further. The Company had agreed not to expend any sum of money raised under the powers of the Bill in sinking new wells, and to restrict their power of supplying water in bulk to the urban districts of Cheshunt and West Ham, and such part of the county of Essex as was contained within a straight line drawn from Bishop's Stortford to Lee, near Canvey Island.

Sir *Alexander Binnie*, Engineer in Chief of the London County Council, examined by Mr. FREEMAN, said he found the total capacity of all the Company's reservoirs, if the present proposal was carried out, would be 7400 million gallons. The Company proposed to obtain from these reservoirs 37·4 million gallons; so that for each million gallons they provided storage to the extent of 192 or 193 million gallons. On the other hand, the authorized draught on the Thames by the eight Companies was 185½ million gallons, and the storage which Lord Llandaff's Commission considered sufficient for this quantity was 6177½ million gallons; so that on the Thames the storage was only 33·3 million gallons for each million gallons supplied. The quantity of storage for a daily yield of 300 million gallons was, by the same report, estimated at only 17,500 million gallons. The capacity of the storage the Company already possessed and in construction was 2400 million gallons, and this, in his opinion, was sufficient to supply the 37·4 million gallons in a period like 1893, 4, and 5. In fact, in 1899, when only 1210 million gallons storage was completed, the East London Company did not at any time run short, because a good many communication pipes had been, under Mr. Chaplin's Act, completed. The Companies had already expended £156,000 on this scheme of intercommunication; and they were at present asking the Local Government Board to sanction a further expenditure of £472,000 for the same purpose. So that if the other Companies were able to help the East London Company in 1899, they would be still better able to do so in the future. The method proposed in the Bill was, he considered, wasteful.

In cross-examination by Mr. BAGGALLAY, witness said his view was that a scheme involving an expenditure of more than a million pounds should not be allowed to pass till the Water Board or Trust, which would be formed, had had an opportunity of considering it. The question of purchase had been considered since 1852. There was a very general consensus of opinion in favour of it.

Mr. BAGGALLAY: It would have been a very unfortunate thing if, for 48 years (since 1852), the Water Companies had had to live from hand to mouth, on the chance of purchase?

Witness: It would be advantageous to the public if they had been put upon terms at a much earlier period.

Do you suggest any Company could have provided for the wants of London if they had had to live from hand to mouth during these 48 years?—I think the state of London is a scandal to our legislation. It is the only town which has not its water supply in its own hands.

Cross-examination continued: In his opinion, the East London Company was a defaulting Company, who could not discharge their statutory duties without the aid of other Companies; and they were seeking by the present Bill to be able to do so, and thus increase the price which would be paid for the undertaking. He did not think the proposed reservoirs would ever be made.

Mr. *G. F. Deacon*, examined by Mr. FREEMAN, generally corroborated the evidence of Sir Alexander Binnie. The reservoirs were, in his opinion, not desirable, because they were extremely wasteful, and the same thing could be attained in other ways.

This concluded the case of the London County Council.

The Committee having been addressed by Counsel,

The CHAIRMAN said: The Committee find the preamble of the Bill is proved; but they add the sterilizing clause as regards purchase. That is clause 3 in the Metropolitan Water Act.

Wednesday, May 16.

To-day, the various clauses were considered. The sterilizing clause was to the effect that if the undertaking of the Company is purchased within seven years by any public body or trustees, "Nothing in the Act shall be deemed or construed to authorize the Company to bring into account, or make any claim in respect of, any advantages conferred on them as resulting from the passing of this Act. Provided that in the event of such purchase the Company may bring into account the actual cost of any capital expenditure made by them in execution of the powers of this Act." The number of years during which the sinking fund may be suspended was reduced from seven to three.

The Bill was ultimately ordered to be reported, as amended, to the House.

HOUSE OF COMMONS COMMITTEE.

Thursday, May 17.

(*Before Colonel* GUNTER, *Chairman*, *Sir* GEORGE PILKINGTON, *Sir* W. HORNBY, and *Sir* W. B. GURDON.)

LAMBETH WATER BILL.

The object of the Bill is to authorize the Company to raise additional capital amounting to £750,000, and to carry out further works.

Mr. PEMBER, Q.C., Mr. CLAUDE BAGGALLAY, Q.C., and Mr. RIGG represented the promoters. Mr. RICKARDS, Q.C., and Mr. F. W. PEMBER appeared for the Chelsea Water Company; Mr. W. MACKENZIE, for the Surbiton Urban District Council; Mr. J. W. GREIG, for Mr. Henry Cooper, owner of the Cedars Estate, Ditton; Mr. WORSLEY TAYLOR, Q.C., and Mr. NEPEAN, for the Esher and Ditton Urban District Council; Mr. LITTLER, Q.C., and Mr. J. SHAW, for Mrs. H. Moreing, owner of land at Esher; Mr. J. C. EARLE, for the Middlesex County Council; Mr. PEMBROKE STEPHENS, Q.C., for Mr. H. Speir and Mr. E. F. Sandys; and Mr. BALFOUR BROWNE, Q.C., Mr. WORSLEY TAYLOR, Q.C., and Mr. FREEMAN, Q.C., for the London County Council.

Mr. PEMBER, in opening the case, said the aim of the Bill was to construct a large storage reservoir at Molesey, a water-tower at Esher, and to lay a 54-inch main from Molesey to Long Ditton. The reservoir would be at the back of Molesey, where the Company's intake was from the the Thames; and the line of pipes would go down to Long Ditton, where the Company had filter-beds and works. They proposed to take land for a water-tower and for additional filter-beds. There was another clause in the Bill, by which they proposed to take land by agreement, not exceeding in extent 20 acres, for the purposes of the Company. The County Council of Middlesex had feared they might purchase part of that land in Middlesex; but the Company had no intention of doing so, because all the works were on the Surrey side of the river. They had consented to do what the Committee required in the case of the East London Bill—to insert a clause as to the seven years' sterilization. They would have preferred that this should only apply for three years; but, under the circumstances, they had agreed to accept the clause, as inserted in the East London Bill.

Mr. H. L. CRIPPS, the Parliamentary Agent of the London County Council, said he could not at once consult a body like the Council. But they felt that this case was so similar to the East London, that they would not be justified in troubling the Committee. If the Water Companies were all in one hand, the reservoir would not be required; but if the Lambeth Company were to retain a separate existence, it might be necessary. If the sterilization and sinking-fund clauses were inserted in the Bill, he did not propose to carry the opposition of the County Council further.

Mr. EARLE said the Company had agreed that no land should be taken in Middlesex under the powers of the Bill; and after what the London County Council had done, he did not propose to re-argue the question before the Committee.

Mr. PEMBER (continuing) said the Urban District Councils of Esher and Surbiton objected to the mains going under their streets at all. They contended that the Company should lay the pipes on their own land; but, in his opinion, one of the main purposes for which roads existed was to accommodate gas and water pipes, and things of that kind. Then there was opposition to the water-tower at Esher. The Company had been asked over and over again to supply water at a high pressure to the parts of the district at a greater elevation than they were bound to serve. To carry out this, they proposed to erect a water-tower on the highest point available; and had chosen some land belonging to Mrs. Moreing. They had scheduled 12 acres; but this was, of course, much more than they would require. The Lambeth Company was one of the oldest in London, dating from 1785. They had a large district of 102 square miles—from the Thames to Croydon, and from Esher to Lewisham—though, by the system of districting adopted by the Companies, they did not supply the whole area. The demand and population were both largely increasing. Their present authorized take of water from the Thames was 24½ million gallons a day; and they had also been in the habit of drawing from the gravel beds near the Thames 7 million gallons daily, which the Conservators claimed should be treated as taken from the river. This was a long standing quarrel, which had been settled by the Bill. The present and existing storage was 462 million gallons—only 14 days' supply on the maximum daily demand of 1899. The population supplied

was 719,000; but at the existing rate of increase, in 1910 the population would be 914,000, and in 1920 1,162,000. In 1898 and 1899, the daily supply of water had reached 36·77 and 36·83 gallons per head. The new storage reservoir would hold 1000 million gallons, as contrasted with the 5000 million gallons which had been granted to the East London Company. The extent of the reservoir would be 78 acres. The learned Counsel then went through and criticized the various petitions against the Bill.

Mr. *Harry Wilkins*, Secretary of the Company, gave particulars of the various stocks and of the financial position of the undertaking. There had been a great increase in the district, both in population and demand. The present daily supply was, on the average, 25,162,060 gallons. In 1898, they had for one month a demand of 32 million gallons daily, and for a short time 33 million gallons. They found the consumption of water of late years increasing. This was partly due, no doubt, to the tendency to fix baths in smaller houses. In their experience, more water was needed in a frost than in a drought, because there was so much loss from breakage of pipes and from customers leaving the taps running. The new distributing main would be laid 2 ft. 9 in. below the surface. They had always found this distance sufficient; but they had had an experience which was almost unparalleled. The Company had a 7-inch main laid at a depth of 3 ft. 4 in. frozen; while a smaller pipe laid at a depth of just under 2 feet escaped. With regard to the future requirements, if the population increased at the present rate, in 1910 a quantity of 40 million gallons daily would be needed, and in 1920 nearly 51 million gallons. The total resources of the Company at present were 34 million gallons a day. The Company were not now affiliated to the other Companies; but they would shortly, by the intercommunication scheme, be brought into union. As at present situated, however, they had no water to supply if the pipes were connected. The storage capacity, when the authorized works were completed, would be 462 million gallons. The intended reservoir would increase this storage by 1000 million gallons. The area of the new reservoir was 187 acres. The site was land completely surrounded by the Rivers Ember and Mole, and was practically an island. The estimated cost of the scheme was £530,000. The new 54-inch main would take the unfiltered water from the Molesey reservoir to the filter-beds at Long Ditton.

Mr. NEPEAN said the objection of the Esher and Ditton Urban District Council was to the mains going along their high road.

Witness (continuing) said they proposed also to erect a tower at Esher. The Esher people had asked for a supply to reach the houses beyond the statutory limit of height; and the only method of furnishing this was by erecting a tower on the highest point available. With regard to the land at Long Ditton for the filter-beds, the Company had acquired part by agreement, and had, but without success, tried to come to terms with Mr. Cooper. They had offered to effect an exchange of land, or to pay him the same price as that at which they had purchased superior land; but Mr. Cooper had declined to treat.

Witnesses having been called to give evidence as to the engineering features and the estimated cost of the scheme, the opposition to the Bill was opened. It was contended on behalf of Mrs. Moreing that her estate would be injured by the erection of a water-tower on the land, and on behalf of Mr. Cooper that the Company were under no such pressing necessity as would entitle them to compulsorily acquire his property.

Friday, May 18.

On behalf of the Surbiton Urban District Council,

Mr. *Taylor*, Surveyor to the Council, stated that a great number of mains and pipes were laid in their roads. In the Maple Road there were already six water-mains, in addition to sewers and gas-mains.

Mr. WORSLEY TAYLOR, for the Esher and Ditton Urban District Council, urged that the Company had no right to disturb and injure their public roads, when, by purchase or easement, they could get land adjoining in which to place their mains. If the water were for the purposes of the district, they would have nothing to say; but the mains were to be put down for the supply of other distant populations.

Mr. *A. J. Henderson*, Engineer and Surveyor to the Council, said he had twice had experience of the roads being broken up for the purpose of laying mains during the fifteen years he had held the office. Speaking generally, the laying of the mains had a most prejudicial effect on the roads, and materially damaged the neighbourhood.

Mr. BAGGALLAY having briefly replied on behalf of the Company,

The CHAIRMAN stated that the Committee would pass the preamble of the Bill, but would strike out the portion which related to the Esher water-tower.

LEGAL INTELLIGENCE.

Compensation for an Accident at the Bristol Gas-Works.

At the Bristol County Court yesterday week, his Honour Judge Austin was called upon to settle a point as to the distribution of funds in connection with a claim against the Bristol Gas Company by Priscilla Davey, the widow of a gas stoker, under the Workmen's Compensation Act. Mr. E. J. Watson, who represented the applicant, told the Judge that the husband met with an accident in February at the Stapleton Gas-Works. He slipped, fell, and fractured his thigh, and died from the effects of the injury. Respondents had paid £130 into Court; and the widow agreed to accept it. There were living with the widow two daughters—an invalid of 25 and a girl of 17. He asked for an order for a distribution of the funds under section 5 of the Workmen's Compensation rules. He wanted to satisfy the respondents that a receipt from the widow might be a good discharge of the claim. His Honour said that he would consult the Registrars as to the order to be made. He would be inclined to let a substantial sum go out at once to the widow, and a substantial amount remain in Court, subject to the applications to be made from time to time to take out sums for the invalid (it being desirable to retain something to meet contingencies); and some small sum might remain in Court for the younger daughter until she attained the age of 21.

MISCELLANEOUS NEWS.

THE SOUTH METROPOLITAN GAS BILL AND THE PRICE OF GAS TO LONDON LOCAL AUTHORITIES.

At Thursday's Meeting of the Court of Common Council, Mr. Alpheus C. Morton, a member of the Streets Committee of the Corporation, introduced a motion standing in his name, with respect to Part V. of the South Metropolitan Gas Bill now before Parliament, and which has just passed the House of Commons Committee. Mr. Morton dealt with the history of the question of the price charged to local authorities in London for gas for public purposes—pointing out the action the Corporation took in 1868 in obtaining the clauses which enabled the various Metropolitan Gas Companies to amalgamate, and to the efforts that the Corporation successfully made in 1883 (when the amalgamation of the Gaslight and Coke Company with the London Gas Company took place), in getting clauses put into the Scheme (which afterwards became an Order in Council), enabling the northern local bodies to have gas for public lighting at the price charged by the South Metropolitan Company. Mr. Morton stated that the sum that the new Municipal Boroughs would lose, unless the 1883 clause could be kept alive, would be between £30,000 and £50,000 per annum; and that with gas at 1899 prices—viz., Gaslight and Coke Company 3s., and South Metropolitan Company 2s. 1d.—the amount would be considerably over £30,000 a year. It was all very well, said Mr. Morton, to state that, under the 1876 sliding-scale, the sum saved would go to the consumers—in fact, some people said seven-eighths of it. He, however, was not so sure of that; it might go into a reserve fund. Anyway, "I prefer to have eight-eighths in hand to seven-eighths in the 'bush'," said the councillor. It was stated by the member for Farringdon Ward that the sum in question capitalized would come to a million of money. There was no opposition to the motion, which was unanimously carried in the following terms: "That it be an instruction to the Town Clerk to direct attention of the Local Authorities on the northern side of the River Thames to the South Metropolitan Gas Company's Bill in Parliament, and to request them to present petitions to the House of Lords against the proposal of the Company to purchase the portion of the district of the Gaslight and Coke Company on the southern side of the river, as this proposal, unless the Bill be amended, would have the effect of largely increasing the price of gas to the authorities on the north side of the river beyond the rate fixed by the Amalgamation Scheme of 1883 of the Gaslight and Coke Company and the London Gas Company."

THE WHITWICK AND COALVILLE GAS ARBITRATION.

The Umpire's Award.

The Coalville Urban District Council were, by an Act of 1899, authorized to purchase the undertaking of the Whitwick and Coalville Gas Company; and the arbitration proceedings to determine the price to be paid for the undertaking were reported in the "JOURNAL" for April 24, p. 1067. It may be remembered that Mr. Corbet Woodall, M.Inst.C.E., was appointed Arbitrator by the Council, and Mr. Alfred Colson, M.Inst.C.E., of Leicester, by the Company. Mr. J. Shiress Will, Q.C., was the Umpire. The figures of the valuers who gave evidence varied considerably. On the part of the Council, the value was put at £22,911; and for the Company as much as £55,360 was claimed. In addition to the price of the undertaking, the Company were entitled to the cost of obtaining their Act of 1898, and to the expenses of winding up. The Act also provided for compensation to officers and servants for loss of employment. The award of the Umpire, which has just been declared, fixes the price of the undertaking at £39,900; the costs of the Act of 1898, at £1193; the expenses of winding up, at £200; and compensation to the Secretary £400, and to the Sub-Manager £200. The Manager, being continued in the service of the Council, received no compensation. One of the main controversies in the case, it should be noted, was whether the net profit of the Company was maintainable owing to the rise in the price of coal.

STOURBRIDGE GAS UNDERTAKING.

Annual Profits and the Price of Gas.

The Stourbridge District Council had before them yesterday week the report of the Gas Committee, which included the monthly and annual reports of the Manager and Engineer (Mr. W. North). The former showed that there were now 2548 prepayment meters in use. The year's working had been fairly good. There was an increase of £707; but, on the other hand, £1580 more was paid for coal. The gross profit was £8753, and the net balance £1865. The Committee recommended an increase of 4d. per 1000 cubic feet in the price. Mr. Purkis (Chairman of the Gas Committee) gave reasons why an increase in the price was necessary. Mr. Haskew urged that a large portion of the net profit of £1865 should go back to the ratepayers' pockets. If there was any benefit to the town from the works, the present ratepayers ought to have it, and not leave all the benefit to posterity. Had anything adverse occurred from the town taking over the works, the present ratepayers would have been responsible; and they should have any benefit there was from the profit on the undertaking. He agreed that a reserve fund was necessary; but they had a reserve fund in the ratepayers' pockets. Mr. Worthington said it was remarkable that the Committee wanted to raise the price of gas by 4d., seeing that they had a profit of £1800 last year. Mr. Collis contended that the proposal to increase the price was unnecessary, unwise, and impolitic, and asked the Chairman of the Gas Committee to agree to a smaller advance. The increase proposed would only recoil upon themselves. The Chairman (Mr. I. Nash) supported the proposal of the Committee, but said he believed the Council had now sufficient reserve, and ought to be able to contribute a proper amount to the reduction of the rates. A contribution of £1000 a year from the gas profits would mean a reduction of 4d. in the pound in the rates. The Committee's proposal was adopted.

COAL CONTRACTS OF THE WALLASEY DISTRICT COUNCIL.

There was a little discussion on the question of the coal contracts at the meeting of the Wallasey District Council yesterday week. The Gas and Electrical Committee recommended the acceptance of the following tenders for twelve months from the 30th of June next: 3000 tons of Audley and Bunker's Hill screened gas coal at 17s. 2d. per ton, 3000 tons of Wigan screened 4-feet gas coal at 16s. 7d. per ton, 2000 tons of Arley gas coal at 16s. 7d. per ton, 4000 tons of best screened Staffordshire gas coal at 17s. per ton, 4000 tons of best washed and screened gas nuts at 16s. 3d. per ton, and 2000 tons of Wigan screened 4-feet gas coal mixed with cannel at 16s. 6d. per ton. The Engineer reported in connection with the supply of cannel that there were none of the tenders that he could recommend for acceptance; but fortunately there were about 3900 tons of cannel still to be delivered under the present contract, and he would therefore be able to get along until about January next. He submitted a letter from the same contractors offering to supply 1000 tons of Abram cannel broken into 4-inch cubes, ready for retorts, at 29s. 2d. per ton, delivered at Birkenhead, commencing after the expiration of the existing contract, and also offering an additional 500 tons. The Committee recommended the acceptance of this offer.

In the discussion, Mr. Bradford inquired whether there was any special reason why the Council should fix a contract so far ahead as next January, as was proposed in the last recommendation. It was possible that prices might be much lower at that time than at present. In reply, Mr. M'Geoch said there was no prospect of prices becoming better for twelve months at least. All the collieries in Lancashire, Derbyshire, Wales, and Cheshire had put up the price of coal 5s. per ton, and no one could get coal at a less price than the Council were paying. He had thought that they would have been obliged to follow in the steps of other authorities, and raise the price of gas, owing to the increased cost of coal—indeed, he considered they would have to put on the 3d. that was recently taken off; but owing to the good supply of cannel in hand, he hoped they would be able to maintain the gas at its present price. The extra cost of coal amounted to about £5000, so it would be seen that the gas profits went to the colliery proprietors and not to the ratepayers of Wallasey.

The Committee's recommendations were adopted.

FATAL ACCIDENT AT THE EAST GREENWICH GAS-WORKS.

At the St. Alphage Mission Hall, Greenwich, Mr. E. N. Wood recently held an inquiry into the circumstances attending the death of Francis George Rayner, aged 25, which resulted from an accident sustained by him while unloading coal at the East Greenwich station of the South Metropolitan Gas Company. Mr. J. J. Washington appeared for the Company; and Mr. T. Owner, one of Her Majesty's Inspectors of Factories, was in attendance. Charles Glazier stated that deceased, who was his brother-in-law, was accustomed to loading coal. Witness, who was also employed at the gas-works, last saw deceased alive just before he went on board the *John Macintyre* to work. In reply to the Inspector, witness said he saw the skip just before it was hoisted. He did not notice any defect in it, and did not pay sufficiently close attention to see whether the clutches fastening it were properly fixed. The skip started in the wrong position, owing, witness thought, to the crane being too far over the hold. The man who filled the skip shouted to the hatchway man to hold on, and the skip was brought out and landed on the deck of the vessel. Witness did not think there was anything wrong with the skip, which he had just seen outside the Court. James Goodson, a coal porter, stated that he was acting as hatchwayman. The skip came up sideways, and witness called to the crane driver to land it on the deck. The driver lowered the skip steadily, and witness put the hook in the centre. After adjusting the hook, he gave the signal to the crane driver to lift, and the skip was raised. Witness then heard of the accident. Edward Martin, the driver of the crane, said he lowered the skip very slowly on to the deck, and when he again lifted it he could see by the light of the hatchway that the hook was in the centre. When witness had raised the skip about 30 feet, it began to slew; and when the crane was about at full speed, the skip turned over. Witness shouted to those underneath, and stopped the crane. The deceased was 40 feet below the skip when the coal fell. William Brown, another coal porter, said he was in the forehold of the vessel, in the next tank, to deceased, about 10.30 p.m., when he heard the crane driver shout. He saw a lot of coal coming down, and jumped out of the way, dragging his companion with him. When the dust had cleared off, they saw the deceased lying with his head between the two tanks, and nearly covered with coals. They picked him up, and found he was dead. Mr. J. Tysoe, the Superintendent of the station, said the skip was of the type in general use, and he considered it was in perfect working order. It had been used for 15 years without an accident. William Bowman, an engineer, said he had had more than nine years' experience in unloading coal. He had examined the skip outside the Court, and found it was in good condition for working. Dr. Davies deposed to the deceased being dead when he saw him. He said there was a severe depressed comminuted fracture of the skull, and death would be instantaneous. The Jury returned a verdict of "Accidental death."

MONTE VIDEO GAS COMPANY, LIMITED.

Difficulties of a South American Undertaking.

The Ordinary General Meeting of this Company was held last Tuesday, at Winchester House, Old Broad Street, E.C.—Mr. T. C. Tatham in the chair.

The report and statement of accounts (to which reference was made in the "Journal" for the 22nd ult.) having been taken as read,

The Chairman moved their adoption. He commenced his remarks with a feeling allusion to the death of the late Chairman (Mr. A. K. Mackinnon), and recalled to mind the vast amount of time and attention that that gentleman had given to the affairs of the Company. Among other points, he mentioned that Mr. Mackinnon was Consul for Uruguay in this country, and was very jealous for the honour and integrity of the Municipal Authorities of Monte Video. He felt very keenly that, at the time when the Company's concession expired, they were not treated with that justice they had a right to expect, and that others were preferred while they had not an opportunity of going in for a new concession as, the Directors thought, their concession secured to them. At the same time, their late Chairman was of opinion that, sooner or later, this would be acknowledged, and equivalents granted to them. Turning to the balance-sheet, the Chairman pointed out that the total capital receipts outstanding were less by £5360 than last year. This was accounted for by the payment off of debentures to that amount. The debenture debt was now £38,180, having been reduced to this figure from its original amount of £58,080. The reserve account now stood at £54,100, insurance fund at £12,500, and the contingency account at £8172—making a total of £74,772. The balance on profit and loss account was £19,155, which was an increase of £2602 over the preceding year. On the other side of the balance-sheet, they had written off capital out of profit and loss £1057; and £1879 had been added to capital expenditure, for new mains, services, and meters. Stocks showed a total decrease of £1112; and materials for use were less by £793. The Government account amounted to £5611. This, he wished the shareholders to understand, the Government did not repudiate; on the contrary, they said it would be paid. It was due with interest; but for this the Directors had taken no credit. The Government had owed them considerable sums before; and, though very often they had been slow payers, they had on all occasions satisfied the debt in some way or another. Investments and other property amounted to £39,765. This sum included the various stocks in which a considerable portion of the reserve fund was invested, and which were worth in the market some £1500 more than they took credit for. In regard to the financial result of the year's working, he said that after paying all outgoings, the profit amounted to £21,945, to which they added interest and discount amounting to £1029, and a small profit on exchange £132—making in all £23,106 to be dealt with. From this they took the interest on debentures £2177, also £717 for bad and doubtful debts; and they wrote off from capital £1057. Finally, they had to deal with the balance of £19,155, out of which they proposed to pay a dividend, and carry forward a balance, which was small, but he hoped was an earnest of better things to come. The proposed dividend was not a satisfactory one, especially bearing in mind that this was a South American Company; and therefore subject to many vicissitudes which did not occur to English companies or to companies in more settled countries. But when he recalled to mind circumstances of which the shareholders had been advised from time to time, he thought they would agree that they had passed through some considerable difficulties; and he hoped he might say they had come to the end of a long lane. In 1888, they were lighting all the leading public streets in Monte Video; and for this service they received during that year £22,500. Now they only lighted a small suburb, for which they received £265; so that there was about £22,250 which used to come to them which they did not now receive. The Electric Light Company who supplied the streets was practically a Government concern; and it worked under advantages which were denied to the Gas Company. The Electric Company had a very large capital—£350,000; and they had not yet paid a dividend. Of course, competition with a Company like that was somewhat difficult. When the price of gas was reduced, they had every right to suppose that the private lighting would have materially extended. Had it done so, they would certainly have again reduced the price of gas materially to increase the consumption; and the result of this would undoubtedly have been that they would have had a better dividend. During the last two years, the number of private consumers had increased very considerably—by more than 700; but the consumption of gas had not increased in the same proportion, because less gas was now used with the improved means of lighting. He did not see why, as the city grew, and things looked better, they should not get a larger number of private consumers, paying a moderate price and receiving a good article; and he believed the Company would then stand on a firmer and stronger basis than it had hitherto done. He should not like to mislead the shareholders to think this was coming about quickly, or that it was certain to come. But he thought it right the Directors should tell the shareholders what were their difficulties, their hopes, and their aspirations.

Mr. M. T. Hoop seconded the motion.

Mr. Trethewy considered that the item of sundry debtors (£16,200) was a heavy sum; it was an increase of £1228 upon last year's account.

Mr. J. Treleaven (Managing Director of the Launceston Gas Company), in the course of a long speech, said they had been told by the Chairman that they had lost the public lighting; and they all knew the public lighting in nearly every town had a great effect upon dividends and the consumption of gas. Tests in many large centres in England had proved that they had a superior thing to the electric light in the incandescent gas-burner; and if it was applicable in England, it was applicable in foreign parts. The Chairman had told them the electric light undertaking in Monte Video had a capital of £350,000; but they themselves had a capital of £541,920. How they got such an amount of capital, with such a small outcome, he was at a loss to understand. He felt there had been a leak in the ship for a long time; and if they went on, this leak would sink the ship, because the capital was so large that it would require £27,096 a year to pay 5 per cent. upon it. Their £20 shares could now be bought on the Exchange at about 10½. The only way to get their gas consumed was to show the people of Monte Video how to produce illumination at the smallest possible cost; and, even if each individual used less gas, they would have the number wonderfully increased. He would earnestly ask the Directors to take into serious consideration the question of competing with the times; and even if in doing so they paid no dividend in the coming year, the value of the shares would be enhanced in two years' time.

Explanations in regard to one or two other matters were asked for by shareholders.

The Chairman, in reply, said that sundry debtors included the amounts due for gas, residuals, fittings, &c., on the day to which the accounts were made up. The amount of gas which they produced was 75 million cubic feet, which was nothing like the quantity they ought to make; and they had capacity for sending out a deal more. In every conceivable way they had tried to extend the use of gas for purposes other than lighting;

but it was a most difficult thing to get people in South America to depart from their habits. The price of gas in dollars worked out to 14s. 9d.; and the Directors were very anxious to reduce it. Everything that Mr. Treleaven had suggested had been foreseen and acted upon. As to the Company being over-capitalized, it should be remembered that it was started many years ago when people gave very large sums for concessions; and whatever the capital was now, it was their inheritance, and they must do the best they could with it. There was, however, no need to write it down. He also commented upon the fallacy of comparing foreign with English companies.

The motion was adopted.

A dividend of 8s. per share, making, with the interim distribution, 3½ per cent. for the year, was declared.

Mr. Simpson Rostron, in moving the re-election of the Chairman and Mr. Robert Morton as Directors, pointed out that, while the number of consumers increased last year by 13·93 per cent., the sale of gas only advanced by 4½ per cent. This meant simply and solely that a large part of the consumers were burning the gas in incandescent burners, so obtaining more light while using less gas.

The motion was unanimously carried.

The Auditors were next re-appointed; and resolutions having been agreed to recording the shareholders' appreciation of the services of the Directors and staff at home and abroad, the proceedings terminated with a vote of condolence with the family of the late Chairman.

ELECTRIC LIGHTING NOTES.

New plant, for which the contract price is £22,837, is to be erected at the Leicester Corporation electric lighting works. This is part of the scheme authorized by the Council on Oct. 24 last.

For the buildings required in connection with the Heywood Corporation electric lighting scheme a tender, amounting to £3073, has been accepted; and for the chimney shaft, 120 feet high, a contract for £630 has been entered into.

In connection with the Keighley Corporation electric lighting works, the Electricity Committee have recommended the acceptance of tenders for plant amounting to £7104. Messrs. Clayton, Son, and Co.'s offer has been selected for Lancashire boilers, economizers, and pumps.

Two men employed at the Mars Iron-Works, Ettingshall, were on Friday taken to the General Hospital at Wolverhampton, having sustained injuries from an electric shock. It was found that both were dead. They had come into contact with an exposed part of a wire connected with the electric lighting plant on the works.

The Electric Lighting Committee of the Dudley Town Council have issued a report recommending that the Corporation wire the premises of all consumers of electricity free of charge, but not to include brackets, pendants, or other fittings, and that £10,000 be borrowed to cover the cost. They also recommend that consumers shall have, until further notice, the option of being supplied at 5d. per unit throughout, or at 6d. per unit for two hours a day, to be determined by the Corporation or their Engineer, and 1½d. per unit for the remaining twenty-two hours; and that no rental be charged for meters.

We learn from a local paper that the Electric Lighting Committee of the Hanley Corporation have incurred the following losses: In 1897, £188; in 1898, £377; and in 1899, £2269—total, £2834. The Editor of the paper referred to would not be surprised if it were found that several hundred pounds had been lost in addition since the present year began; but the figures given above cannot, he says, be got over. In the return made to the Board of Trade for last year, there is the statement: "Balance carried to the general district rate account, £2269"—meaning, apparently, that this is the sum which the ratepayers will have to make good. He adds: "What the public want to know is why, in the first place, there was any loss at all; in the next place, how the loss came to take the tremendous jump from £376 in 1898 to £2269 in 1899; and lastly, is the loss still going on, and, if so, when it is likely to cease and give way to a profit."

The annual report of the Electric Light Committee of the Hull Corporation for the year ended March 31 was presented for adoption at their last meeting. This is the seventh year's working of the undertaking. At the beginning of the past financial year, £94,958 had been expended in buildings, plant, and equipment; and during the year the Committee incurred further liabilities to the extent of £38,844. The total capital expenditure is £133,802. Two 800-horse power sets were erected, and on March 31 there were 1326 consumers connected, taking 940,192 units of current during the year, against 960 consumers and 749,690 units in the previous year. The Committee have 54 motors taking supply from the mains, of sizes varying from $\frac{1}{16}$ to 35-horse power, many of which were connected during the past year; and a 50-horse power motor will shortly be coupled up. The gross receipts were £19,290; the expenditure was £10,631; and the gross profit, £8659. Deducting the contribution to the sinking fund, interest on loans, amount written off for depreciation of meters, &c., the net profit is £1924—a much larger amount than that realized in the previous year.

The electricity works of the Buxton Urban District Council have recently been opened. The Provisional Order was obtained in 1894, but no steps were taken to give effect to it until 1898, when Professor Kennedy was invited to report on the system of electric supply best suited to the conditions and requirements of the district. He advised a three-wire low-pressure system; the pressure being about 230 volts. A handsome brick building was erected on a site near the gas-works, at a cost of £5000; while the expenditure to date on machinery, feeders, mains, lamps, posts, &c., amounted to £14,000. The station equipment consists of three water-tube boilers, capable of evaporating 4500 lbs. of water per hour; four high-speed engines of a total of 320-horse power, and coupled direct to six four-pole continuous-current dynamos, having a total capacity of 198 kilowatts. For the day load, a battery of accumulators has been installed, containing 260 cells, with a capacity of 250 ampère-hours and a maximum discharge rate of 100 ampères. The feeding and distributing mains consist of concentric lead-covered and armoured cables for the feeders, and triple-concentric cable for the distributors. The Local Government Board's sanction to a loan for the works was for £24,769; so that the Council have a balance in hand to provide further machinery, if necessary, for which space has been reserved

GAS-PIPING IN BUILDINGS.

Recent cases of asphyxiation by gas in Boston (U.S.A.) led Mr. J. Lyman Faxon, the Architect of the building for the High School in that city, to contribute to the "Transcript" an interesting article on the dangers arising from gas-fittings and the methods of avoiding them. The following abstract of the article appeared lately in the "Engineering Record."

The Building Department and Board of Health of Boston have recently formulated a new code of regulations governing the installation of gas-piping. While it is quite specific upon comparatively unimportant points, it misses altogether the prime essentials and all-important features of the matter—viz., the system or plan of such installation. It is all very well to be specific as to the kind of piping, joints, couplings, &c., and method of securing them; but herein do not lie the chief causes of danger. The bulk of the work put in by gas-fitters is not installed in an imperfect manner or with inferior materials, as things go. Under the present antiquated system of installations, fatalities are just as likely to occur where the piping has been installed with the best materials and honest workmanship. Further fatalities will continue to occur, under any system, when deliberately planned for suicide, and until the public discontinue the senseless and dangerous habit of turning the gas down to a low candle power, as is often done in the case of sickness, or because some person cannot go to sleep in the dark, or the householder wishes to save the gas bills.

Cases of suicide by gas are probably not one in 100 of the fatalities; and 99 out of 100 are due to improper installation as to system or plan of the work. The habit of lowering the gas, so far as saving by turning down the flame is concerned, has the following result: A clean burner full on consumes about 5 cubic feet of gas per hour, and gives approximately from 12 to 15 candle light; at half cock, it consumes 2½ cubic feet per hour, and gives approximately the light of 3 candles; and when turned down to 0·75-candle power, it consumes 1¼ cubic feet per hour. So that, as the light is turned down, the consumption of gas is increased disproportionately, due to incomplete combustion. While saving something on the gas bills, this reduction of the flame increases the danger.

The natural flow of gas in piping, when under pressure or free from obstructions, is upward, and towards the freest combustion. It can be forced, by pressure, down pipes; but if the pressure is unequal, by reason of imperfectly disposed piping or by larger consumption at other points, its flow will be towards those parts of the system which are under the greatest pressure or freest consumption. It is, therefore, of the greatest consequence that the pressure in any system of piping shall be equal and constant at all points. The pressure in vertical pipes increases about 10 per cent. for every 30 feet of rise, and diminishes about 5 per cent. for every 30 feet of fall; so that the difference in pressure between two burners 60 feet apart vertically will be about 15 per cent. of the initial or normal pressure. This accounts for the extinguishing of the gas-flame when turned down low.

The present system of gas-piping is radically wrong, entirely inadequate, and extremely dangerous. Building laws are framed to safeguard life in regard to structural stability, fire, egress, the effects of electricity, and insanitary arrangements, but in respect to gas-piping practically no improvement has been made for a quarter-of-a-century, and it is still the rule to follow the same old dangerous system. It ought to be clear to the lay mind—and certainly so to the architect, builder, and gas-fitter—that no gas-pipes in a building should be run vertically down; and yet thousands of pipes are so installed. Generally speaking, the present system of installation is to take the main supply-pipe from the meter to some central point in the basement of the building, whence a vertical riser is run to the top storey; diminishing in size as it ascends, and taking off at each floor a branch supply-pipe, with tap circuits or feeders to the ceiling and wall lights of the storey below—all ending in dead-ends. There is rarely any sub-division of the system into individual circuits. The outlet-taps are usually taken off the bottom of all horizontal lines of piping, instead of the side or top of the pipe—thus causing all such taps and the appended fittings to constitute receptacles for condensation, instead of providing for the return of condensation to the base; and, further, there is no provision whatever for equality of pressure throughout the entire system. Now, under this arrangement, let us state a case, and a common one, in any building of three storeys or more: Time, 10 o'clock p.m.; place, room on a lower floor, with occupant sleeping, gas-flame turned down to ¼-candle power, windows and doors closed, and no ventilation. At 12 o'clock, or later, party returns from theatre with friends to room in top storey, and turns on all burners full. The flame in the lower room is extinguished by the drawing of the flame into the pipe, caused by the excessive use of gas in the upper rooms; in a few moments the draught is relieved, gas is ejected into the lower room through the open burner, and the occupant is asphyxiated in three or four hours if the accident is not discovered.

The proper system for installing gas-piping Mr. Faxon outlines as follows: (1) Each and every separate storey or apartment in a house, hotel, office, or other building liable at any time to contain a sleeping occupant, should have its circuit from the base or initial source. (2) All gas-heaters and gas-stoves should have separate circuits from the initial source. (3) All corridor, hall, and vestibule lights should likewise have separate circuits. (4) All circuits should have pipes for equalizing pressure, making complete circuits throughout individual systems from the initial sources, up, round, and back to their source. He has found in practice that the sizes of such pipes must be about five-eighths that of the main supply circuits, and that proper installation costs from 20 to 25 per cent. more than under the old system. (5) The individual main circuit supply-pipes should be taken off a properly calculated header or drum, and each circuit cut off by a suitable valve at the header; thence the individual circuit should be run to a centre of distribution of branch and tap circuits. All vertical pipes should be run up, and not down; and all off-takes should be at the side or the top of the pipes, and in no case at the bottom. All piping should pitch towards the initial source, to allow for condensation. The main circuit pipe should be continued throughout and round the entire individual system, and returned from the farthest point to, and connected with, the base or initial circuit pipe. This is of the utmost importance. Properly installed, the danger of the gas service will not only be reduced to a minimum (provided people exercise care in the use of the burners), but the quality and illuminating power of the gas will be materially increased. This

system has been used by Mr. Faxon for about ten years in his practice; so that it is not in any sense an untried theory.

The foregoing abstract may be completed by the following quotations from the specifications prepared by Mr. Faxon for the High School buildings already referred to: "Pipe the building throughout for gas to the several outlets indicated on the plans and sections; also to all outlets and fixtures in and for the benches, hoods, and other apparatus in the several laboratories, according to the best work and requirements. The pipe and fittings are to be of the best make; and care is to be taken to see that lines and fittings are free of scales and obstructions, and of the standard sizes for the supply to the number of burners at individual outlets. All piping in and for the chemical laboratory to be of finished brass tubing, and fittings iron pipe sizes. The main supply is to be entered from the street service, and a meter provided and set in the boiler-room. The main from the meter is to supply a 'drum' or header, off which are to be taken the several circuits hereafter specified; and each circuit pipe is to be fitted with a finished brass full-way valve, and tagged with a nickel-plated name-plate, designating the individual circuit. Mains and branches are to be run as direct as possible, along with electric conduits—in no case passing under or over such conduits when avoidable; and all outlet ends are to terminate in boxes (provided by the electric lighting contractor), the rims of which are to be set flush with the face of the finished plastering. All branches are to be taken from the side or the top of the mains, not from the bottom; and all piping for the wall outlets is to be run up, and not down. All piping is to have an even and constant grade and pitch to the initial sources, and all traps or pockets are to be avoided. Piping and fittings are to be secured by iron hold-fasts—no screws or nails will be allowed; and all outlets are to have the quarter fitting within the outlet-boxes, and not at the back of them, and the outlets capped. All the main circuits are to be installed so as to provide for a continuous and connected circuit and circulation from the initial source, up, over, and down, and returning to the base of supply, to ensure a constant and even pressure throughout and at each individual outlet. The amount of lighting power at each outlet is to be equal to the combined candle power provided for at each outlet. The gas-fitter is to co-operate with the electrical contractor, and effect the installation of gas-piping parallel to, and in connection with, the installation of the electric conduits. The complete installation is to be tested by the Gas Company, at the expense of the Contractor; and the Company's certificate of inspection and approval is to be deposited with the Architect."

The Acetylene Light Syndicate, Limited, is not a particularly prosperous concern. According to the accounts recently sent out, the issued capital is shown to be £4151; debentures, £3275; loans, £900; sundry creditors, £2323; and overdraft at bank, £1396—making with other small amounts the total liabilities £12,090. As assets certain patents figure for £1831; plant, engines, &c., for £3770; carbide process plant for £1281; sundry debtors for £577; and stock for £598, &c. Having taken credit for these and other items, the accounts state that there is a net loss of £2872.

LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The "Sterilization" Clause—Legislative Proposals for Next Session.

At the Meeting of the London County Council last Tuesday—Mr. W. H. DICKINSON in the chair—a report brought up by the Water Committee at the previous meeting, in reference to what has become known as the "sterilization" clause in recent Water Acts, was under consideration. The Committee pointed out that in the Staines Reservoirs Act, 1896, the clause ran as follows:—

> If the undertaking of any of the three Companies be purchased within seven years from the passing of this Act otherwise than by agreement by any public body or trustees, nothing in this Act contained shall extend or be deemed or construed to extend to authorize the Company to bring into account, or to make any claim in respect of, any advantages conferred on them by, or resulting from, the passing of this Act.

In the Southwark and Vauxhall Water Act, 1898, the period was ten years. In one instance—that of the Southwark and Vauxhall Water Act, 1884—the time has already expired; while in the Staines Reservoirs Act above referred to it will expire in 1903, and in two other Acts (the Staines Reservoirs Act, 1898, and the Southwark and Vauxhall Water Act, 1898) in 1905 and 1908 respectively. The Metropolis Water Act, 1899, which provides for intercommunication of supplies between the Companies, also contains a similar clause, the operation of which will cease in 1906. The Committee went on to say that the fact that, under the Staines Reservoirs Acts of 1896 and 1898, which authorize an expenditure of £1,250,000, the great advantages of this clause to the ratepayers would be lost if purchase were not effected by 1903, was one of the several reasons urged in favour of legislation during the present session. It was obviously quite possible that, even if the Government introduced a Purchase Bill next year, the purchase might not be completed in time, and would then be attended with greatly enhanced expense. The present position was that the Council's Bills had been rejected, but no promise had been made on behalf of the Government that the subject would be dealt with next session. It was therefore of great importance to the ratepayers that the period during which the clause would apply should be extended. They therefore recommended "that a Bill be promoted by the Council in the next session of Parliament to provide that, in the event of a Bill being passed for the purchase of the Water Companies' undertakings within the period up to 1908, the clauses in the several Acts of the Companies known as the 'sterilization' clauses shall be deemed to be in operation up to that date; and that the preceding recommendation be referred to the Parliamentary Committee."

Mr. BEACHCROFT objected to the Council initiating further legislation on the water question, and moved, as an amendment—"That, in the opinion of the Council, there ought now to be no delay in the settlement of the water question, but that further legislation should be initiated by the Government, and accordingly that the First Lord of the Treasury should be asked whether such legislation is contemplated."

Mr. R. A. ROBINSON seconded the amendment.

Dr. COLLINS thought the suggestion that they should again go to the

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1492.

Issue.	Share	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment	Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0	60,000	5	Feb. 23	7	Ottoman, Ltd. . . .	5—5½	..	6 7 3
100,000	10	,,	7½	Do. 7 p.c.	13½—14¼	..	5 3 5	500,000	100	June 1	6	People's Gas 2nd Mtg. of Chicago Bonds.	102—106*	+3	5 13 2
800,000	100	Jan. 2	5	Australian 5 p. c. Deb. .	102—104	..	4 16 2								
230,000	5	May 16	6	Bombay, Ltd. . . .	6—6½	..	4 12 4	851,070	10	Apl. 27	7	River Plate Ord. . . .	10¼—10¾	..	6 10 3
40,000	5	,,	6	Do. New, £4 paid .	4—4½	..	5 6 8	250,000	Stk.	Dec. 29	4	Do. 4 p. c. Deb. .	101—103	+1	3 17 8
380,000	Stk.	Feb. 23	12	Brentford Consolidated	250—260	..	4 12 4	250,000	10	Apl. 11	8	San Paulo, Ltd. . . .	1 3/8—12½	..	6 8 0
270,000	,,	,,	9	Do. New . . .	185—190	..	4 14 9	135,000	Stk.	Mar. 14	10	Sheffield A.	246—247	..	4 1 0
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0	209,053	,,	,,	10	Do. B.	244—245	..	4 1 4
159,375	,,	Dec. 14	4	Do. 4 p. c. Deb. .	118—123	..	3 5 1	447,427	,,	,,	10	Do. C.	241—246	..	4 1 4
220,000	Stk.	Mar. 14	11½	Brighton & Hove Orig. .	235—240	..	4 15 10	5,600,000	Stk.	Feb. 23	5⅔	South Metrop., 4 p.c. Ord.	125—128	+1	4 3 3
226,320	,,	,,	8⅔	Do. A. Ord. Stk. .	175—180	..	4 14 5	1,520,000	,,	Jan. 12	3	Do. 3 p. c. Deb. . .	98—100	..	3 0 0
999,500	Stk.	Feb. 23	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11	380,940	Stk.	May 16	5	Southampton Ord. . .	115—120	..	4 3 4
420,000	20	Mar. 29	10	British	39—40	..	5 0 0	70,825	,,	Dec. 29	4	Do. 4 p.c. Deb.	120—125	..	3 4 0
50,000	10	Feb. 23	12	Bromley, Ord. 10 p. c. .	24—26	..	4 12 4	120,000	Stk.	Mar. 14	6	Tottenham A. 5 p.c. and B. 3½ p.c.	93 - 98	..	4 11 10
79,000	10	,,	9	Do. 7 p. c. . . .	19—21	..	4 5 8	250,520	,,	,,	4½				
500,000	10	May 16	6	Buenos Ayres (New) Ltd.	9—9½	..	6 6 4	55,100	,,	Dec. 14	4	Edmonton 4 p. c. Deb.	113—117	..	3 8 5
220,000	Stk.	Dec. 29	4	Do. 4 p. c. Deb. .	100—102	+1	3 18 5	182,380	10	Jan. 12	5	Tuscan, Ltd.	7—8	..	6 5 0
150,000	20	Mar. 14	8½	Cagliari, Ltd. . . .	24—26	..	6 6 11	149,900	10	Jan. 2	5	Do. 5 p. c. Deb. Red.	101—104	..	4 13 2
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	14—15	..	5 6 8								
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	55—57	..	5 5 5								
550,000	Stk.	Apl. 11	13⅓	Commercial Old Stock .	275—285	..	4 14 9								
236,425	,,	,,	10⅔	Do. New do. .	210—220	..	4 15 5								
288,237	,,	Dec. 14	4⅔	Do. 4½ p.c. Deb. .	141—144	..	3 2 6								
800,000	Stk.	May 31	9	Continental Union, Ltd.	155—165*	+4	5 9 1					WATER COMPANIES.			
200,000	,,	,,	7	Do. 7 p. c. Pref. .	173—175*	+1⅓	3 18 8	780,399	Stk.	Dec. 29	11	Chelsea, Ord.	305—310	..	3 11 0
51,600	Stk	Feb. 23	14	Croydon A 10 p. c. . .	335—340	..	4 2 4	150,000	,,	,,	5	Do. 5 p. c. Pref. .	157—162	..	3 1 9
173,400	,,	,,	11	Do. B 7 p. c. . .	265—270	..	4 1 5	160,000	,,	,,	4½	Do. 4½ p. c. Pref. 75	145—150	..	3 0 0
555,000	Stk.	Feb. 23	5¼	Crystal Palace Ord. 5 p.c.	116—120	..	4 7 6	175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	145—150	..	3 0 0
60,000	,,	,,	5	Do. 5 p. c. Pref. .	133—135	..	3 14 1	1,720,560	Stk.	Apl. 11	7	East London, Ord. . .	188—193	..	3 12 6
486,090	10	Jan. 26	11	European, Ltd. . . .	19½—20½	+⅛	5 7 4	654,740	,,	Dec. 29	4½	Do. 4½ p. c. Deb. .	145—150	..	3 0 0
354,060	10	,,	11	Do. £7 10s. paid .	14½—15½	+⅛	5 6 5	890,000	,,	,,	3	Do. 3 p. c. Deb. .	99—101	..	2 19 5
11,993,075	Stk.	Feb. 9	4⅘	Gas-light 4 p. c. Ord. . .	99—102	+4⅓	4 16 0	700,000	50	Dec. 14	7½	Grand Junction 10 p. c. max. .	104—107	+2	3 10 1
2,600,000	,,	,,	3⅓	3½ p. c. max. .	96—98	..	3 11 5	810,000	Stk.	Mar. 29	4	4 p. c. Deb. .	130—135	..	2 19 3
3,799,735	,,	,,	4	and 4 p. c. Con. Pref.	116—118	..	3 7 10	708,000	Stk.	Feb. 23	14	Kent	307—312	..	4 9 9
3,993,975	,,	Dec. 14	3	Coke 3 p. c. Con. Deb.	96—99	..	3 0 7	160,000	,,	,,	7	Do. New, 7 p. c. max. .	200—210	..	3 6 8
70,000	10	May 31	8	Hongkong & China, Ltd.	13½—14½*	+½	5 10 4	1,043,800	100	Dec. 29	10½	Lambeth, 10 p. c. max. .	290—295	..	3 11 2
2,800,000	Stk.	May 16	10	Imperial Continental .	203—206	+1	4 17 1	406,200	100	,,	8	Do. 7½ p. c. max. .	207—212	..	3 15 6
473,600	Stk.	Feb. 9	3½	Do. 3½ p. c. Deb. Red.	100—103	..	3 8 0	850,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	130—133	..	3 0 2
75,000	5	Dec. 14	6	Malta & Medn., Ltd. .	4¾—5¼	..	5 14 3	500,000	100	Feb. 23	13½	New River, New Shares	417—422	+2	3 4 0
560,000	100	Apl. 2	5	Met. of 5 p. c. Deb.	107—110	+1½	4 10 11	1,000,000	Stk.	Jan. 26	4	Do. 4 p. c. Deb. .	132—137	..	2 18 5
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	105—107	..	4 4 1	902,300	Stk.	Dec. 14	7½	South-wark Ord. . . .	195—200	..	3 15 0
541,920	20	May 31	3½	Monte Video, Ltd. . .	10½—11½*	+⅛	6 1 8	126,500	100	,,	7½		185—190	..	3 18 11
667,946	Stk.	Feb. 23	9¼	Newc'tle & Gatesh'd Con.	215—220	..	4 4 1	489,200	Stk.	,,	5	7½ p. c. max., and 5 p. c. Pref.	160—165	..	3 0 7
299,855	Stk.	Dec. 29	3½	Do. 3½ p. c. Deb. .	104—107	..	3 5 5	1,019,585	,,	Apl. 11	4	Vauxhall 4 p. c. A Deb.	129—134	..	2 19 9
150,000	5	May 16	8	Oriental, Ltd. . . .	7—7½	..	5 6 8	1,155,966	Stk.	Dec. 14	10	West Middlesex . . .	285—290	+2	3 9 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—6¾	..	5 6 8	200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	147—152	..	2 19 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1½	..	4 11 5	200,000	,,	Mar. 14	8	Do. 8 p. c. Deb. .	99—101	..	2 19 5
				* Ex. div.									*Ex div.		

Government and ask their views on the water question was a little redundant. It was quite possible for legislation to be initiated without taking any such step. The Council had put forward a policy which was acceptable to the majority of the London electors. To approach the Government would, in his opinion, only be a waste of time.

Mr. HARRIS expressed the opinion that it was highly desirable for the Council to approach the Government before any resolution was passed in favour of further legislation. The only way in which they could settle the water question was through the Government, who held the keys of the situation.

Mr. WHITMORE, M.P., also considered that the only way of settling the matter was by the Government. At present the First Lord of the Treasury could not answer the question suggested in the amendment. The Government should, however, be pressed to deal with the subject at the earliest possible moment. This could best be effected by the Council unanimously passing a resolution thereon.

The amendment was rejected.

Mr. WHITMORE then moved, as a further amendment—"That, in the opinion of the Council, there ought now to be no delay in the settlement of the water question, and that Her Majesty's Government should initiate legislation on the subject as early as may be possible."

Mr. COHEN, M.P., seconded the amendment.

Mr. M'KINNON WOOD (Chairman of the Water Committee) thought the opinion expressed in the amendment would not have the slightest weight with the Government. It was to be assumed that the legislation desired by those who supported the amendment was on the lines of the report of the Royal Commission. He severely criticized the Trust as proposed by the Commission, and said that the suggestion for the constitution of such a body was only part of the attack which was now being made on municipal enterprise. In standing up for the Council's proposal in reference to the London water supply, he believed he was defending the true principles of municipal government.

After some further discussion, the amendment was, on a division, rejected by 70 votes to 35, and the recommendation of the Committee adopted.

The Council then proceeded to consider another report brought up by the Committee at the previous meeting. They stated that, in view of the Standing Orders of the Council, which require that schemes involving parliamentary sanction shall be brought up not later than the first meeting in June, they had directed their attention to the question of the action which the Council should be advised to take next session with regard to legislation. They pointed out that, neither in replying to the deputation who waited upon him, nor in the debate in the House of Commons, in which he opposed the second reading of the Council's Bills, was any indication given by the President of the Local Government Board of the course which the Government intended to pursue; nor was it known whether they were likely to propose legislation based on the recommendation of the Royal Commission in favour of purchase. After giving the matter due consideration, they advised the Council to adopt the same course as in the last two years, when, by a suspension of the Standing Orders, the Committee were enabled to present their report after the summer recess. They recommended—"That the Standing Orders be suspended so far as they would affect proposals for legislation in the session of 1901 dealing with the Metropolitan water supply, and that the Water Committee be authorized, if they deem it advisable, notwithstanding the Standing Orders, to recommend applications to Parliament on this subject at any time not later than Nov. 13, 1900."

The recommendation was adopted.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

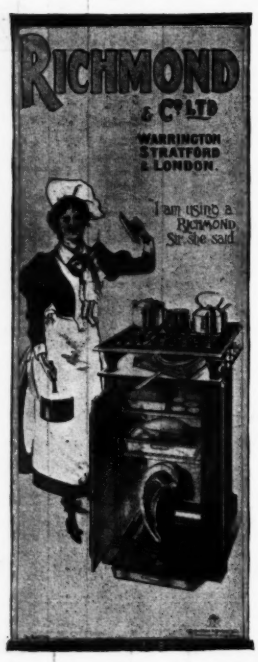
Saturday.

Many will learn with regret that Mr. Kinloch Anderson, who has taken so great an interest in the gas supply of Edinburgh and Leith since the creation of the Gas Commission there, in 1888, has been laid aside from work by illness—a sudden seizure of a paralytic nature. Happily it is not severe; and there is strong hope of his recovery. Should he be unable to return to his place in the Commission, his loss will be very much felt. There is not any member who has the work of the Commission at his finger-ends as has Mr. Kinloch Anderson. The subject of his illness was mentioned by Provost Mackie, of Leith, who presided over a meeting of the Commissioners on Monday. He said they had all heard with much regret of Mr. Anderson's illness; and they would be glad to learn that he was now very much better. Mr. Waterston suggested that the Clerk should write a kindly letter to Mr. Anderson, on behalf of the Commissioners; and this was agreed to unanimously.

The report of the Engineer (Mr. W. R. Herring) showed that during the month of April the gas made at the three stations of Edinburgh, Leith, and Portobello, amounted to 120,420,000 cubic feet, an increase of 3,816,000 cubic feet over April of last year. Between May 16, 1899, and the end of April, the total output of gas was 1,832,331,000 cubic feet, an increase over the corresponding period of the preceding year of 97,812,000 cubic feet. This, it was explained, was equal to an increase of 5·52 per cent. In the corresponding period of the preceding year, there was an increase of 4·4 per cent.

The Finance and Law Committee reported the redemption of a £10 annuity of the Edinburgh and Leith Gas Company, at the price of £292 10s. This is equal to 29¼ years' purchase. In the year 1908, it becomes open to the Committee to redeem all the annuities at 28½ years' purchase, so that the price at which this annuity has been extinguished is very moderate.

The Perth Gas Commission met on Monday to make an appointment to the post of Engineer and Manager. Meeting in committee, they proceeded to vote upon the three applicants who were on the short leet. This resulted as follows: Mr. A. Waddell, of Broughty Ferry, 15; Mr. W. B. M'Lusky, of Selkirk, 13; and Mr. D. Easson, of Maybole, 12. Mr. Easson was dropped; and the final vote resulted as follows: Mr. M'Lusky, 14; Mr. Waddell, 12. The meeting was then made an open one of the Commission; and on the motion of Lord Provost Macgregor, Mr. M'Lusky was unanimously appointed. It was, the Lord Provost



COAL PRICES TO GO HIGHER IN SUMMER.

It is almost certain, the *Morning Leader* thinks, that 30s. a ton for coal will be passed before long. For a month or two the price may possibly drop to 29s., supposing there is a fine summer; but in August the almost unbroken steady rise of twelve months will again continue its career.—*Westminster Gazette, May* 9, 1900.

We shall be glad to provide Gas Departments with TRAINED INTERVIEWERS (Ladies or Gentlemen), to impress this on their Consumers, and to show that GAS, although advanced in Price, is cheaper than COAL as a Fuel. Please communicate with us if you decide to increase your Day and Summer Consumption.

May we refer you to Gas Departments in all parts of the United Kingdom, as to Methods and Results?

said, a matter of congratulation to every one of them to know that they were to have as Manager one so well qualified and experienced as Mr. M'Lusky. He trusted that the future of the gas-works in Perth would be to the satisfaction of the whole community, and to the credit of Mr. M'Lusky. Mr. Watson, Convener of the Works Committee, who seconded, said he thought they had been very fortunate indeed in securing for the appointment a gentleman of the capabilities of Mr. M'Lusky. Mr. M'Lusky, who is 32 years of age, was trained as a gas engineer, and holds certificates in chemistry, machine construction, building construction, and drawing. He has special experience in coal analysis. I also beg to offer my congratulations to Mr. M'Lusky on his promotion to so important a post at so early an age. He has plenty of work in front of him; and he has the spirit and the ability which will enable him to face it. There are few men in the ranks of gas managers who have a mind so well stored with facts and reflections relative to gas supply, or who have a greater readiness in the application of their knowledge to circumstances as they arise.

It is not before time that the Perth Gas Commissioners are setting about the removal of the works to a new site. There is no room to work in the present buildings; and, as for storage, materials have to be piled up any way. The store of coal has been built up in bulk till it has affected the stability of one of the buildings. The front wall is so bulged out that it has been necessary to put on a watchman to prevent people walking where it is dangerous.

The statement is made that it has become a practice in Perth to insert what are known as coal checks in prepayment meters. As many as 60 of these were found in meters on Monday, which was the removal term day in Scotland. A criminal prosecution is spoken of.

The Bothwell and Uddingston Gas Company have issued their report for the year ending April 30. The balance at credit of the revenue account, after charging all renewals and bad debts, amounts to £3057—being an increase of £591 over that of the previous year. The amount at the credit of the profit and loss account, after writing off £498 for depreciation, and including a balance of £939 from the previous year's account, is £3367. The Directors recommend a dividend at the rate of 10 per cent., the addition of £500 to the reserve fund, and the carrying forward of £1067. The quantity of gas manufactured was 44,700,000 cubic feet; and the amount consumed was 41,975,500 cubic feet—about 4,000,000 cubic feet increase. Unaccounted-for gas amounted to 6 per cent., which was slightly less than a year ago.

I mentioned last week that the Municipality of Cupar were about to take over the public lighting of the burgh from the Gas Company. It will be better in every way that the public lighting should be in the hands of those who bear the responsibility. This responsibility is not only to the citizens in the matter of lighting the streets, but to the wider public who may frequent the streets, in the shape of liability to recompense in the event of injury. The Commissioners have felt this in an action which was brought against them in the Sheriff Court, at the instance of a female factory worker, who claimed £6 as damages for injuries which she sustained on account of the streets not being sufficiently lighted. Sheriff Armour gave her decree for £3 7s. 4d. His opinions may be of interest, as showing the attitude of a fresh mind upon the methods of public lighting. He was far from saying that the Commissioners were precluded from utilizing the light of the moon when it was available; but this must be done in a reasonable manner, and with reasonable provision for its failure, as was not uncommon, on a wet, cloudy December afternoon. It seemed impossible to affirm that the defenders' method of utilizing the moon's light at the time the accident happened was reasonable, or that there was any suitable light at the place; and, accordingly, he had no alternative but to give decree against them. The primary cause of the accident was the darkness that prevailed at the spot; and it seemed idle to say that the plaintiff should have walked on the south side of the street, or held her hand out in front of her. On this principle, her only safe course would have been to have carried a lantern.

The two following items appeared in a Glasgow newspaper this week: "In connection with the fixing of gas coal contracts, it may be stated that never before did so many coalowners withdraw their first offers and affix a further advance in quotations. No end of litigation was threatend by gas companies; and in most cases the coalowners had to hold by their first offers. The early prices for cannel averaged 19s. 9d. per ton; but latterly the quotation was 20s. 6d. to 21s." "Some of the Scotch private coal companies are earning enormous dividends. A local concern has just distinguished itself by declaring one of 75 per cent." The latter is most probably correct; the former I regard as merely guesswork.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 2.

Sulphate of Ammonia.—The market has been quiet throughout the week; and prices have been barely maintained—closing quotations being £11 3s. 9d. to £11 7s. 6d. per ton f.o.b. at the ports. There has been a fair amount of inquiry. But buyers have been for the most part unwilling to operate except at a discount upon present prices; and this makers whose stocks are light have been slow to concede. The business transacted has therefore been of a very limited character. In forward delivery no business of importance has transpired; and quotations remain about £11 10s. per ton.

Nitrate of Soda is easier; the quotations being 8s. 3d. per cwt. for ordinary, and 8s. 6d. for refined, quality.

LONDON, *June* 2.

Tar Products.—There is an absence of strength in most of the articles on this market. Urgent sellers are offering at a reduction in the prices of several of the staple products. The scarcity of timber, and the difficulty in procuring material, has undoubtedly shortened the use of creosote; while the increased production of this product—chiefly in Scotland, from blast furnaces—has also damaged its prospects. Benzols are steady; and the formation of a Benzol Committee, which includes most of the large producers, it is hoped will prevent some of the violent

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fluctuations which have marked this article for some time. A slightly better feeling exists in respect to solvent naphtha, as well as the burning quality; but makers have stocks, and no important improvement can come until these are moved. Again there is more inquiry for anthracene; makers being firm in their ideas of value.

The average quotations during the week are: Tar, 17s. 6d. to 27s. 6d. Pitch, east coast, 37s. 6d.; west coast, 34s. 6d. Benzols, 90's, 7d.; special qualities for gas, 9d.; 50's, 10d. Toluol, 1s. 2d. Solvent naphtha, 1s. 1d. Crude naphtha, 3½d. Heavy naphtha, 11d. Creosote, 2¼d. Heavy oils, 3d. Carbolic acid, 50's, 2s. 3d.; 60's, 2s. 9d. Naphthalene salts, drained, 30s.; pressed, 70s. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—The little spurt that commenced last week has apparently spent itself. At the moment, sulphate is neglected; and buyers are holding off for lower prices. Few makers have any stocks, and only a small business is being done; the average value at present being £11 2s. 6d. to £11 5s. per ton, less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—During the past week there has been an extra pressure for supplies of all descriptions of fuel, to carry merchants and consumers over the Whitsuntide holidays; and this has for the time being checked any tendency to slacken off which was previously becoming noticeable. The important gas coal contracts are now being rapidly settled; and in all cases the basis is that of an advance of 5s. per ton over last year's prices. This represents from 13s. to 13s. 6d. per ton at the pit for the lower qualities, such as Wigan four-feet gas coals, and 14s. to 14s. 6d. for the better qualities of screened Arley coals. These prices apply to the larger contracts, with perhaps 3d. or 6d. per ton more obtained in odd cases on some of the smaller quantities. Not only have the coalowners taken advantage of the position to secure this advance of 5s. per ton, but there has been a very drastic overhauling of the contract conditions; and clauses which, during the past two or three years, have been very much complained of as bearing unfairly upon collieries, have been altogether eliminated. In fact, coalowners just now have the "whip-band," and are making use of the position to the utmost to their own advantage. The better qualities of round coal are in fairly brisk request for house-fire purposes; and other descriptions of fuel, including the lower qualities of round coal and slack, are in pressing demand for iron making, steam, and general manufacturing purposes. All the coal the collieries are raising is going away; and the main difficulty they have to face is to provide sufficient supplies to keep customers going during the prolonged Whitsuntide stoppages of the pits, as practically there are no stocks whatever upon which they can fall back. Prices at the pit are firm at the full rates last quoted—namely, 13s. and 13s. 6d. per ton for common round coal, to 14s. 6d. and 15s. 6d. for the better qualities, and from 10s. 6d. to 11s. 6d., according to quality, for engine fuel. Shipping is moderate, with Association list rates unchanged at 14s. 6d. per ton for unscreened, to 15s. 3d. for screened steam coal, delivered at the Mersey ports. But these prices are not being very readily obtained; and in some cases collieries outside the Association are offering at rather lower figures. Coke meets with an exceedingly active demand; and on forward contracts advances on current rates are being secured. At the ovens, furnace cokes are now quoted at 24s. 6d. to 25s. per ton, with foundry sorts about 31s. to 32s.

Northern Coal Trade.—Though the demand for coal has been influenced by the scarcity of steamers to carry it away, yet on the whole there has been a better demand felt during the last few days. Possibly, this may be partly in preparation for the holidays. Steam coals, however, were rather lower in price last week; and 18s. to 18s. 6d. per ton f.o.b. may be looked on as the current rate for best Northumbrian qualities. Gas coals are active in demand—the deliveries on old contracts being considerably above those usual in the middle of the summer; while there are heavy shipments in progress to the Baltic. Thus the large output of the collieries is well taken up; and it may be said that gas coals are still relatively scarce. Local contracts have been taken up at or equal to about 16s. per ton f.o.b.; while for occasional cargoes about 17s. per ton is the f.o.b. price. In some quarters, however, the opinion is beginning to prevail that prices have now reached their maximum. Coke is very steady, without much change in the price—about 35s. per ton f.o.b. for best Durham coke for export. The gas coke trade is again dull, and must be expected to continue so till the settlement of the mid-year contracts. The production of gas coke is about at its lowest; and stocks are very limited at all the works near navigable waters.

Scotch Coal Trade.—A strong demand still continues. The miners are not working quite so steadily as they did during the winter, with the result that supplies are getting less, and prices are advancing. It has been resolved by the coalmasters to increase the price of splint for consumption in iron-works by a shilling per ton. The price is now 14s. per ton at the pit, as compared with 7s. 6d. this time last year. The quotations are: Main 14s. to 14s. 3d. per ton f.o.b. Glasgow, ell 15s. 6d. to 16s. 6d., and splint 15s. 6d. to 16s. The shipments for the week amounted to 232,661 tons—an increase of 7703 tons upon the previous week, and of 50,106 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,115,230 tons—an increase of 919,406 tons upon the same period of last year.

A Cumberland Water Scheme.—At a meeting at Wigton last Tuesday, a General Committee of representatives of the Holm, Cultram, Wigton, and Aspatria District Councils unanimously passed a resolution recommending that the Overwater and Ellen water scheme, by which it is proposed to supply a wide area to the north and north-west of Cumberland, be adopted, and that preparation be made for a Bill in Parliament. The Engineers (Messrs. Pickering and Crompton, of Whitehaven) stated that, in case the public authorities failed to act, the scheme would be carried out by private enterprise. Other particulars of this scheme were given in a paragraph in the "JOURNAL" for May 8.

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The Quality of the South Metropolitan Company's Gas.—At the meeting of the London County Council last Tuesday, the Chairman of the Public Control Committee (Mr. N. Robinson), replying to a question by Mr. Steadman, M.P., said it had been found that there was "a good deal of carbon dioxide in the gas furnished by the South Metropolitan Gas Company;" and he warned the public that the gas was more dangerous than the ordinary coal gas.

New Joint-Stock Companies.—The Paignton Dowson Gas Company has been registered with a capital of £656, in £1 shares, for the purpose indicated by the title. The Manchester Acetylene Gas Company, Limited, has been formed with a capital of £50,000, in £1 shares, to acquire the business of the Manchester Acetylene Gas and Carbide Company, Limited, and the patents of A. Kay relating to improvements in gas-valves and apparatus for generating and storing acetylene gas.

A Plumber's Carelessness Wrecks a New House.—A disastrous explosion occurred at the house of his Honour Judge Humphrys, at St. Ives, last Friday week. An escape of gas was observed in one of the rooms; and a plumber, in trying to discover the leak, lit a match, and the explosion immediately followed. The interior of the house was completely wrecked. Laths, plaster, crockeryware, and furniture were scattered in all directions. The plate-glass windows were blown out front and back; and some of the stones in the front of the building were forced out of position. It is a new house, only just occupied. The plumber had a narrow escape, and was burnt about the face, but not seriously.

An Increase in the Price of Gas at Swansea Irritates a Corporation Committee.—The Streets Committee of the Swansea Corporation are much annoyed with the Gas Company, and some of the members said all manner of hard things about them at a meeting last Tuesday. The cause of irritation was a communication from the Company giving three months' notice to terminate the agreement as to the cost of public lighting, so as to allow of an increase from 2s. 10d. to 3s. 4d. per 1000 cubic feet. The reason given was "the great increase in the cost of coal, materials, and labour." Mr. Lee remarked that by the time the agreement ceased, the Corporation would have their electric lighting scheme completed. Mr. Merrills: August twelve months. The Chairman (Colonel Pike) asked the feeling of the meeting, and Mr. Hopkin said it was that they ought to own the gas-works. Alderman Morgan said he was disgusted at such an imprudent demand being made on the town and Corporation. At Birmingham, the price of gas had been decreased from 2s. 6d. to 2s. 2d., and yet, after this, a profit of £50,000 was made. Then take Plymouth, where they had no coal-field, and yet only 2s. 2d. was charged for public lighting. All he hoped was that the electric lighting works would be pushed forward; and he could not help thinking there was a kind of fatality about the present action of the Company, for they could not have done anything more detrimental to themselves if they had deliberately thought it out. He protested against the Company being allowed to stop the progress of the town, as he asserted they were doing at present. It was decided to send a communication pointing out the cost of gas to public authorities in other towns.

Leigh Gas and Water Supply.—The annual reports on the gas and water undertakings of the Leigh Town Council show a gross profit of £9586 on the former, notwithstanding the payment of 1s. 3d. per ton more for fuel than in the year ending March 31, 1899. There was a profit of £203 on the water undertaking.

Grand Junction Water-Works Company.—The report and accounts of this Company for the half year ending the 31st of March have been issued, in view of the ordinary general meeting on the 13th inst. The balance applicable for distribution is £68,596, as compared with £57,982 in the corresponding six months of 1898-9; and the Directors recommend dividends at the rates of 7½ and 7 per cent. per annum—the latter being on the "D" shares. After meeting the charges in connection with the Staines reservoirs, and paying these dividends, the undivided profit will be £21,646, against £16,904 at the commencement of the half year.

Yorkshire Coalowners and Gas Coal Contracts.—The West Yorkshire coalowners met last Tuesday afternoon, at the Great Northern Hotel, Leeds, to consider the suggestions made by the Gas Committees of the Leeds, Bradford, Halifax, Huddersfield, and Keighley Corporations as to the proposed new terms of contract for the supply of gas coal. As already stated in the "JOURNAL," they more particularly object to the proposal to limit the quantity of coal delivered to the gas-works during the winter months to 60 per cent. of the whole contract. The colliery proprietors point out that they do a large trade in house coal during the winter, and to deliver a considerable proportion of their output to the gas-works in those months would seriously interfere therewith. As the result of the meeting, the Secretary (Mr. Day) was instructed to write to the Chairman of the various Committees affected, intimating that the coalowners could not see their way to alter their proposal in regard to the delivery of coal. They consented, however, to slightly vary the wording of certain of the clauses in the new terms.

Tipton Gas Department.—The accounts of the Gas Department of the Tipton Urban District Council for the year ending the 31st of March last, as certified by Mr. J. E. Rowley, the Auditor, have been issued. They are accompanied by a working statement by the Engineer and Manager (Mr. Vincent Hughes), who, as mentioned in our "Personal" column, has obtained the appointment at Smethwick rendered vacant by the removal of Mr. B. W. Smith to Walsall. The total capital expended at the close of the year was £84,635. The sale of gas, residual products, &c., produced a revenue of £15,826, as compared with £14,425 for the preceding year; the expenditure being £9455, against £8483. The gross profit was consequently £6371, as compared with £5942. The net profit was £2104, which, added to the £3987 of accumulated profits, made a total of £6091. Deducting £250 paid in aid of the district rates, there is left a balance of £5841 to carry forward. The quantity of coal and cannel carbonized was 9338 tons (20 cwt.); and of gas made, 99,609,000 cubic feet, or 10,667 cubic feet per ton. Of the 99,754,624 cubic feet of gas which passed the station meter, 91,148,541 cubic feet were sold and used on the works; the loss by leakage, condensation, &c., being 8,606,083 cubic feet, or 8·62 per cent.

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SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Cont.)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000

	Cubic Feet Daily.
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.,	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000

Gas-Works Extensions at Colne (Lancs.).—On Wednesday, Mr. H. P. Boulnois, one of the Local Government Board Inspectors, considered an application by the Colne Corporation to borrow various sums of money, among them £12,100 for gas-works purposes. It was stated that the profits from the gas-works had increased from £235 in 1887 to £3518 in 1899-1900. It was proposed to increase the producing capacity of the works by 50 million cubic feet per annum; making the total capacity 220 million cubic feet.

The Award in the Horsforth Water Arbitration.—Mr. R. E. Middleton, M.Inst.C.E., the Umpire in the arbitration between the Horsforth District Council and the Horsforth Water Company in connection with the purchase of the works of the latter (see *ante*, p. 1012), has issued his award. Mr. H. A. Johnston and Mr. C. Gott, who acted for the Company, placed the value of the undertaking at £56,276; the valuations of Mr. E. M. Eaton and Mr. E. J. Silcock for the District Council being £26,874 and £26,743 respectively. The amount of the award is £41,969 12s. 5d.

Wolverhampton Water Supply.—For some years the Wolverhampton Corporation Water Committee have been endeavouring to discover an additional source of water supply. At present water is obtained from wells at Cosford, which yield in good seasons 3 million gallons per day; and at Tettenhall and Goldthorn Hill, which produce about 250,000 gallons per day. The output of the wells is, however, found to be inadequate at times, and borings have been made at Dimmingsdale; but they have now proved unsuccessful. Other sites examined have also been rejected; and it is understood that the Committee propose to submit for the approval of the Corporation a scheme for deepening the wells at Tettenhall. They were sunk by the old Water Company half-a-century ago; and it is believed that, if they are taken to a greater depth, the output will be much increased, and will bring up the quantity to a volume sufficient for the needs of the district for some years to come.

Fatal Accident at the Dublin Gas-Works.—On Monday last week, an inquest was held by Dr. Louis Byrne, City Coroner, at Sir Patrick Dun's Hospital, on the body of John Bradiley, a workman who was killed by falling from a scaffolding at the works of the Alliance and Dublin Consumers' Gas Company. It was stated in evidence by the foreman in charge of the work for the Contractors (Messrs. T. Piggott and Co., Limited) that there were two sets of scaffolding, and the one on which the deceased was standing was erected inside a gasholder tank, and was 20 feet high. It was suspended by wire ropes, and the accident was caused by one of them breaking. The deceased fell to the metal floor of the tank, and received very serious injuries. Witness said he had had twenty years' experience of this class of work. The scaffold was erected under his supervision, and he was perfectly sure that it was thoroughly sound. He had strict orders to have the best scaffolding, and to spare no expense in its erection. He was a foot from where the deceased fell when the scaffolding gave way without warning. He believed it was capable of bearing a weight to the extent of 1 ton 14 cwt., in addition to four men. He had tested it a fortnight previously. Dr. G. Taylor described the injuries, and said the deceased died of shock and hæmorrhage. The Jury returned a verdict of "Accidental death."

Proposed Incandescent Gas Lighting at Bideford.—A few months ago the Bideford Town Council appointed a Committee to confer with the Gas Company on the subject of the public lighting, about which there has been considerable complaint. At a meeting of the Council on Thursday last, it was decided that the Committee should continue their services, and that the Company should be asked to light the main streets of the town by incandescent burners.

Bideford Water Supply.—A report presented to the Bideford Town Council last Thursday showed that the quantity of water in store is only 17½ million gallons, against 21½ million gallons this time last year. For the first five months of the year, the rainfall has been only 1·68 inches, as compared with 2·68 inches in 1899 and 4·21 inches in 1898. At present the water is turned off at 10 p.m.; and the Water Committee recommended that the question of further curtailment should be left in the hands of the Mayor.

Middleton Gas and Electricity Supplies.—At the meeting of the Middleton Town Council last Thursday, Alderman Walker presented the annual report of the Gas and Electric Lighting Committee. The gross receipts of the Gas Department for the year were £20,398; and the expenditure (less annuities, sinking fund, &c.), £13,180—leaving a gross profit of £7218. The net profit was £1970. The amount of gas manufactured was 8,985,700 cubic feet more than in the previous year; and this he thought was very satisfactory. In regard to electrical matters, Alderman Walker said successful negotiations had been carried through between the Corporation and the British Electric Traction Company for the provision by the Municipal Authority of motor power to drive the trams being laid between Chadderton and Manchester, *viâ* Middleton.

Staffordshire Potteries Water Company.—The meeting of this Company was held at Hanley last Wednesday. Reporting upon the working during the year ending March 25 last, the Directors stated that the revenue was £47,383; being an increase of £2636. The profit was £23,913, to which must be added the balance brought forward from the previous account (£1461), making a total of £25,374. After providing for the interim dividend, there remained a balance of £13,824, from which the Directors recommended a dividend at the rate of 9 per cent. on the consolidated ordinary stock, making, with the interim payment, 8½ per cent. for the year, and a dividend at the rate of 7 per cent. per annum on the consolidated new ordinary stock. After paying these, £992 will remain to be carried forward. The increasing demand of the district for water, it was stated, was being fully anticipated, and further works were now in progress with the view of meeting all requirements. The Directors regretted to record the death since the last meeting of Mr. J. Beaumont Piercy, who for a period of 32 years was Secretary of the Company. In moving the adoption of the report, the Chairman (Mr. J. F. Wileman) said that last year he had the pleasure of congratulating the holders of new stock on the attainment of their full statutory dividend, and this year he had to congratulate the old stock holders on having gained one more step in that direction; and there seemed to be every reason for thinking they would soon be in possession of their full statutory rights. The report was adopted; and, among other business, the salary of the Secretary (Mr. H. J. Wildin) was increased £100 a year.

C. & W. WALKER, LTD.,

Midland Iron-Works, Donnington, nr. Newport, Shropshire.

110, CANNON STREET, LONDON, E.C.

Telegraphic Addresses: "FORTRESS, DONNINGTON, SALOP." "FORTRESS, LONDON."
Codes used A.B.C. and "A1."
Telephone No. 12, WELLINGTON, SALOP.

MAKERS OF GADD & MASON'S SPIRAL-GUIDED

GASHOLDERS

GASHOLDERS.

WITH OR WITHOUT STEEL STANDARDS AND TANKS.

PURIFIERS. PURIFYING-MACHINES FOR AMMONIA. SCRUBBERS.
TAR-EXTRACTORS. RETORT MOUTHPIECES OF ANY SHAPE.

WECK'S PATENT CENTRE-VALVES.

CONDENSERS. SIEVES.

CRIPPS'S GRID-VALVE
For bye-passing the lower layer in Purifiers.

TAR-BURNERS. VALVES.

TYSOE'S SELF-SEALING MOUTHPIECES.

Tar-Distilling Plants. Claus' Sulphur-Recovery Plants.

SULPHATE OF AMMONIA PLANTS.

The New Water-Works for Todmorden.—For a long time Todmorden has had in view the provision of its own water supply, without being dependent on Rochdale and without trusting to private enterprise; and last Thursday, with the cutting of the first sod for the reservoir at Gorpley, the borough may be said literally to have put its hand to the work. The duty fell to the Mayoress (Mrs. Ormerod), who discharged it in the presence of a large gathering. For the purpose Mr. B. Lumb presented her with a silver spade, and the Mayor with a wheelbarrow. The water, which is to be derived from the surrounding hills and moorland, has been declared by competent authority to be of the best in the country; and the works now started for collecting the rainfall will no doubt meet the demands of Todmorden for a long period. When the need arises for extension, no difficulties are likely to stand in the way. The Act of Parliament which the Corporation obtained for the present purpose, and which went through its final stage in August, 1898, authorizes the construction of two reservoirs in the Gorpley valley, though it is only intended as yet to make the larger of the two. This of itself involves an outlay of more than £49,000, is to cover 15½ acres, and to have a capacity of 120 million gallons. As it is reckoned that in the driest years Todmorden will be sure of a daily supply amounting to 600,000 gallons, this appears likely to be adequate for some years. The Engineer for the scheme is Mr. G. F. Deacon.

Gas Discounts and the Grouping of Gas Accounts in Bradford.—Commenting upon this question (which was referred to in a paragraph last week), the "Bradford Observer" says: "Perhaps the Bradford Corporation Gas Committee will hardly be surprised if their proposal to discontinue the system of grouping a number of small accounts into one should provoke more controversy than the addition of 3d. to the price. It means, apparently, the abolition of the custom, which has been found convenient by multitudes of cottage consumers, of paying their gas bills in weekly instalments along with the rent. House owners and agents have hitherto found the discount an adequate remuneration for taking the responsibility; but unless an allowance be made to them in some other form, it is unlikely that they will continue to stand between their tenants and the Corporation. Consequently the tenants will have to pay the less convenient half-yearly lump sum; and the City Collector's department will be saddled with a large amount of the most troublesome kind of work. The change might be unobjectionable, or even necessary, if Bradford, like most other large centres, had adopted the penny-in-the-slot meter for small consumers, which not only gets rid of the discounts, but actually brings an increased profit on the gas thus consumed. But as matters stand, the merit of the proposal seems at least as debatable as that of gas discounts generally, which, after much discussion, the Committee has decided to maintain." The principal estate agents of Bradford and the Property Owners' Association have decided to work in conjunction for the purpose of sending a united notice from all cottage owners withdrawing responsibility for the gas accounts of tenants.

Messrs. W. C. Holmes and Co., of Huddersfield, have received an order from the Corporation of Ilkeston for one of their patent "New" rotary scrubber-washers.

Messrs. Biggs, Wall, and Co. have received orders for the installation of their patent "Rapid" charging-machines from the Ilfracombe, Exmouth, and Enniskillen Gas Companies.

The sale which Mr. Alfred Richards will conduct at the Mart next Tuesday will comprise debenture and ordinary stocks and shares in the Herne Bay, Southend, Walton-on-Thames, and Weybridge Gas Companies—all new issues by order of the Directors.

The Directors of the Harrogate Gas Company duly received tenders for the £10,000 of 4 per cent. preference stock recently advertised in the "JOURNAL." Applications were made for £16,850, and the £10,000 was allotted at an average price of £104 17s. 10½d. per cent.

To help the income of the city to meet the expenditure, the Leeds Corporation propose to take £24,000 from the profits of the water undertaking this year, and £4000 from the electric lighting undertaking. The Gas Department will not figure as a contributor this year.

The contract for a new retort-house and roof, retort-bench, condensers, exhauster, purifiers, &c., tenders for which were recently advertised for in the "JOURNAL" by the Long Eaton Gas Company, has been secured by Messrs. R. Dempster and Sons, Limited, of Elland. The settings are to be on Chester's regenerator system.

The manufacture of carbide of calcium for generating acetylene gas progresses fast in France, Switzerland, Germany, Italy, Norway, Austria, Russia, and America. Great Britain is rather behind these others. In Canada, 15,500 hydraulic horse power are employed in making it, as compared with 1600-horse power in this country.

In accordance with advertisements in the "JOURNAL," Mr. Alfred Richards will next Tuesday offer for sale as a going concern, at the Mart, Tokenhouse Yard, by order of the Crawley Gas Company, Limited, their freehold gas-works, which are situated within half a mile of the Crawley Station on the London, Brighton, and South Coast Railway, together with about 3½ miles of mains, meters, &c.

It is proposed to reconstruct Frank Wright's Prepayment Gas-Meter Corporation, Limited, under the title of "Metropolitan Gas-Meters, Limited," with a nominal capital of £60,000, consisting entirely of ordinary shares. The ordinary shareholders in the Corporation will have the option of joining the new Company on the basis of an allotment to them of three shares of 10s. each, credited with 8s. paid up, for every two £1 ordinary shares held by them in the old concern; the preference shareholders, the option of taking five shares of 10s. each, with the sum of 8s. credited as paid up thereon, for every two preference shares held by them. It is stated that a "substantial firm" is prepared to underwrite the reconstruction.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS Cycles at reasonable and low Prices. Guaranteed for Twelve Months. Sent on approval. For Cash or Gradual Payment System. Send for Catalogue, Post Free.

MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.

ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

ENRICH your Gas with cheap Benzol. Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE. Apply to SADLER AND CO., MIDDLESBROUGH.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, See p. 1524.]

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application
No. 80, ST. ANDREW SQUARE, EDINBURGH,
NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.

Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

PRACTICAL RETORT SETTERS.

GEORGE NUTTALL & CO., 32, Havelock Road, Saltley, Birmingham.

Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

ENGINEER, with much experience in the Erection and Management of Gas-Works and other Plant in countries where the Latin Languages are spoken, wishes employment at home or abroad.

Address No. 3508, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF STAFFORD.

(GAS AND ELECTRICITY DEPARTMENT.)

THE Corporation of Stafford invite applications for the appointment of ENGINEER and MANAGER to take entire charge of their Gas and Electricity Works.

Applicants must possess a thorough knowledge of Gas Engineering, and be capable of Designing, Superintending, and carrying out any Alterations or Extensions that may be required at the Gas-Works, and undertake the General Management of the Electricity Department.

Salary to commence at £350 per annum, with a prospect of being raised to £400 in eighteen months.

Candidates' Age to be between 30 and 45.

Applications, stating Age, Qualifications, and Particulars of Experience (with *copies* of not more than three recent Testimonials), to be sent to me on or before Saturday, the 16th of June, 1900.

MATT. F. BLAKISTON,
Town Clerk.

June 1, 1900.

ADVERTISER, many Years with leading London Firm of Manufacturing Gas Engineers and having good connection, requires LONDON AGENCY, or would follow up Inquiries on Commission.
Address ENERGY, 43, Victoria House, South Lambeth Road, LONDON, S.W.

WANTED, a Situation as Working MANAGER or FOREMAN in Gas-Works. Good Carbonizer. Erect and Repair Plant; Main and Service Layer. Practical Gas-Fitter. Good Testimonials. Abstainer. Age 49.
G. WATSON, 45, Freeth Street, Oldbury, near BIRMINGHAM.

EXPERIENCED General Engineer's DRAUGHTSMAN wanted.
Apply, stating Age, Experience, and Salary required to WEST'S GAS IMPROVEMENT COMPANY, LIMITED, Albion Iron-Works, Miles Platting, MANCHESTER.

JUNIOR Draughtsman wanted for a few Months on a Gas-Works near London.
Apply, by letter, stating Age, Qualifications, and Salary required, not later than June 9, to No. 3505, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Young Man as Junior CLERK. Must be quick at Shorthand and Typewriting.
Apply, not later than June 9, by letter, stating Age, Qualifications, &c., and Wages required, to No. 3506, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-METER TRADE.

WANTED, Experienced Representative, having good connection, to represent METER FIRM in the Provinces.
Apply, giving all Particulars, to JOHN WRIGHT AND Co., LIMITED, Essex Works, BIRMINGHAM.

WANTED, by a Colonial Gas Company, a SUPERINTENDENT for its Suburban Works. Passage out paid. Wages £4 10s. per week, and free House.
Apply, by letter, stating Age and Experience, to COLONIAL, care of Burbidge, Wilcox, and Co., 62, Moorgate Street, LONDON, E.C.

WANTED, a competent and experienced Retort-House FOREMAN, for a Provincial Works, making 350 million cubic feet of Gas yearly. Must be accustomed to Regenerative Firing and Machine Stoking.
Apply, by letter, stating Wages required, and enclosing *copies* of References, to No. 3503, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN.

WANTED, by a Gas Company in the Midlands, a thoroughly competent DRAUGHTSMAN, experienced in the Design, Construction, &c., of Gas-Works Buildings and Plant. Salary £4 per week.
Apply, by letter, enclosing References, and stating Age, Qualifications, &c., to No. 3507, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Whitehaven United Gas Company, Limited, a married Man, not under 28 years of age, as WORKING FOREMAN. Must be accustomed to Gaseous Firing, making Sulphate of Ammonia, and able to lay Mains and Services.
Apply, with Testimonials, stating Salary required, to the COMPANY, No. 67, Lowther Street, WHITEHAVEN.

BOROUGH OF ROCHDALE.

WANTED, a thoroughly competent MAN to take charge of the Gas-Stove Department.
Applicants must be practically acquainted with the various makes of Stoves, and able to undertake their repair as well as to advise users as to their proper fitting up.
Applications, stating Age, Experience, and Salary required, accompanied by not more than Two recent Testimonials, must be sent in to me not later than noon, on Wednesday, June 13, 1900.
T. BANBURY BALL,
Engineer and Manager.
Gas-Works, Rochdale,
June 1, 1900.

TIPTON URBAN DISTRICT COUNCIL.

TO GAS MANAGERS.

THE Tipton Urban District Council require the services of a competent and experienced MANAGER, to take charge of their Gas-Works—the present Annual Make of Gas being 110 Million cubic feet. He will be required to reside in the Parish, and to devote the whole of his time to the services of the Council. He must be able to design and carry out all Extensions, and have had experience in all Departments. Salary £170 per annum.
Applications, stating Age (which must not exceed 45), present position, Experience, and Training, accompanied by *copies* of not more than three recent Testimonials, and endorsed "Gas Manager," must be sent to the undersigned not later than Ten a.m. on Saturday, the 16th inst.
Canvassing the Members directly or indirectly will be considered a disqualification.
By order,
JNO. W. WARING,
Clerk to the Council.
Public Offices, Tipton,
June 1, 1900.

SECOND-HAND PURIFIERS.

WANTED, Two Second-hand Purifiers, 12 ft. by 10 ft. by 4 ft.
State Condition and Price to J. MACBEAN, Gas Manager, Abertillery, MON.

CAST-IRON TANK.

WANTED, a second-hand Cast-Iron TANK, about 50 to 60 feet diameter. Good condition, and fit for re-erection.
Full Particulars and Price to LEWIS DEMUTH AND Co., LTD., Oldbury, near BIRMINGHAM.

WANTED, a cheap, Second-Hand GASHOLDER of 6000 to 8000 cubic feet capacity with Cast-Iron or Steel Tank. To be erected a short distance from a Seaport in South East of Ireland.
Offers, by letter, to No. 3502, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ENGINES and Exhausters combined "Waller," to pass 30,000 cubic feet per hour. DITTO to pass 7000 feet per hour, overhauled and complete. Cheap to clear. Also BOILERS.
J. FIRTH BLAKELEY AND Co., Thornhill, DEWSBURY.

GASHOLDER, 50 ft. by 18 ft., with Six Columns, 15 inches diameter, Wrought Lattice Girders, &c., complete and perfect. About Fourteen Years old.
Price, erected, on application to J. FIRTH BLAKELEY AND Co., Thornhill, DEWSBURY.

FOR SALE—Two Lancashire Boilers, each 6 ft. diameter by 30 ft. long, with Mountings. Been in use only a short time. Made by the Yorkshire Engine Company, Limited, Sheffield.
Apply to NEWTON, CHAMBERS, & Co., LIMITED, Thorncliffe Iron-Works, near SHEFFIELD, where the Boilers may be seen.

TOWER Scrubber for Sale, cheap, 8 ft. diameter by 52 ft. 8 in. high, with Livesey Washer at the bottom, and filled with Wood Boards, together with Tippler and Tippler-House, Balcony, and Ladder; also 15-inch Inlet and Outlet Disc Valves.
All in good condition, and can be seen now erected on application to W. C. HOLMES AND Co., HUDDERSFIELD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

HYDE GAS COMPANY.

FOR SALE—A Vertical Exhauster and ENGINE, with Two Plunge Pumps, 12-inch Valves and Connections, made by George Anderson. Can be seen working.
For further Information, apply to CHARLES POTTS, Secretary and Manager, Gas-Works, Raglan Street, Hyde, near MANCHESTER.

CONDENSERS, Washer-Scrubbers, "Cutler" patent CONDENSERS (14) 6 in. to 12 in. PIPE CONDENSERS, Patent WASHERS by "Livesey," "Holmes," and "Cockey," EXHAUSTERS up to 60,000 Cubic Feet per hour. ENGINES, BOILERS, &c. Several TOWER SCRUBBERS, PURIFIERS, METERS, GOVERNORS, PUMPS, TANKS, VALVES, &c.
J. FIRTH BLAKELEY AND Co., Gas Engineers, DEWSBURY.

PURIFIERS FOR SALE.

THE Eccleshill and Bolton Gas Company have FOR SALE four PURIFIERS, 8 feet square, with Centre-Valve, and 8-inch Connections, Lifting Gear, &c.
The Purifiers are in good condition, and can be seen working.
For further Particulars apply to
JAMES LEE,
Manager.
Gas-Works, Eccleshill, Bradford,
May 30, 1900.

READING GAS COMPANY.

TAR.

THE Directors of the Reading Gas Company invite TENDERS for the purchase of their surplus TAR for One Year commencing on the 1st of July next.
Specifications for the Contract will be forwarded on application.
Rail communication direct to the Works.
Tenders, endorsed "Tender for Tar," must be delivered not later than Monday, the 18th of June, to
ARTHUR H. CANE,
Secretary.
7, King Street, Reading,
May 31, 1900.

TIPTON GAS-WORKS.

COAL CONTRACTS.

THE Gas Committee of the Tipton Urban District Council are prepared to receive TENDERS for the supply of GAS COAL for a period of One or Two Years, to be delivered, Carriage Free, to the Gas-Works Siding (L. & N.W. Rly.).
Specifications and Form of Tender may be obtained at the Gas-Works, on application to Mr. Vincent Hughes, the Engineer and Manager.
Sealed and endorsed Tenders to be sent to me, the undersigned, not later than Ten a.m. on Saturday, the 16th inst.
The Committee do not bind themselves to accept the lowest or any Tender.
By order,
JNO. W. WARING,
Clerk to the Council.
Public Offices, Tipton,
June 1, 1900.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for 700 Tons of TAR.
Further Particulars and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.
Tenders, endorsed "Tar," to be sent to me not later than Tuesday, June 19, 1900.
By order,
J. H. BALDWICK,
Town Clerk.
Municipal Buildings, Heywood,
May 16, 1900.

URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the supply of CANNEL and best screened GAS COAL, to be delivered at their Gas-Works in Lymm, for a term of Nine Months from the 1st day of July, 1900.
The probable quantities required will be about 180 Tons of Cannel, and about 1200 Tons of Gas Coal, which must be freshly wrought, well screened, and free from Sulphurous Pyrites or other objectionable matter; but the Council reserve the right of increasing or decreasing the quantities named.
The person whose Tender is accepted will be required to enter into an Agreement with the Council for the due performance of his Contract.
Sealed Tenders, stating Price per Ton delivered alongside the Works, to be sent to the undersigned, on or before the 21st day of June, 1900, and endorsed "Coal Tender."
The Council do not bind themselves to accept the lowest or any Tender.
Forms of Tender are not supplied.
Further Particulars may be had on application to the Gas Manager, Mr. Donaldson.
W. MULLARD,
Clerk.
Council Offices, Lymm, Cheshire,
June 1, 1900.

URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works, for a term of One Year from the 1st day of July, 1900.
The Tar and Liquor will be delivered free into Contractor's Boat on the Bridgewater Canal.
The Purchaser will have to enter into an Agreement with the Council for the due performance of his Contract.
Sealed Tenders, stating Price per Ton for Tar and Price per Ton for Liquor (5° Twaddel), to be sent to the undersigned on or before the 21st day of June, 1900, endorsed "Tar Tender."
The Council do not bind themselves to accept the highest or any Tender.
Further Particulars may be had on application to the Manager, Mr. Donaldson.
W. MULLARD,
Clerk.
Council Offices, Lymm, Cheshire,
June 1, 1900.

URBAN DISTRICT COUNCIL OF OLDBURY.

(GAS DEPARTMENT.)

THE Gas Committee of the Urban District Council of Oldbury are prepared to receive TENDERS for the supply of 10,500 Tons, or thereabouts, of screened GAS COAL for delivery during the Year ending the 31st of August, 1901, in such quantities and at such times as ordered, carriage free, at the (1) Oldbury Basin, G.W. Railway, and (2) L. & N.W. Railway, Oldbury.
The Coal must be of first-class Quality, well screened, freshly wrought, and perfectly free from Bats, Pyrites, and other Foreign Matter.
Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Coal," must be delivered to the undersigned, not later than Saturday, June 16 next.
The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.
Tender Forms, and any further Information, may be obtained from the undersigned on application in writing.
By order,
A. COOKE,
General Manager.
Gas-Works, Oldbury,
May 25, 1900.

URBAN DISTRICT COUNCIL OF OLDBURY.

(GAS DEPARTMENT.)

THE Gas Committee of the Urban District Council of Oldbury are prepared to receive TENDERS for the supply of 150 Tons of OIL, suitable for the Manufacture of Carburetted Water Gas.
The Oil to have a Flashing-Point of not less than 78° (Abel's Test), and not less than any higher degree of Temperature which may be specified in any future Act of Parliament, or Regulations to be made thereunder.
The Oil to be delivered, free of all charges, into the Storage Tank of the Council at the Gas-Works, in such quantities and at such times as required, during a period of One Year from the 31st of July, 1900.
Tenders to be at a price per Imperial Gallon.
Analysis of the Oil, with full Description, must be sent in with each Tender along with a sealed sample of the Oil offered.
Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Oil," must be delivered to the undersigned not later than Saturday, June 16 next.
The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.
By order,
A. COOKE,
General Manager.
Gas-Works, Oldbury,
May 25, 1900.

COUNTY BOROUGH OF BURY.
(Gas Department.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of—

37,000 Tons of GAS COAL,
600 Tons of BURGY,
300 Tons of HOUSE COAL.

The same to be delivered in such quantities as stated in Schedule for Gas Coal, but with respect to Burgy and House Coal as from time to time ordered.

Forms of Tender and Conditions of Contract may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders, which must be on the printed forms, and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Bank Street, Bury, endorsed "Tender for Gas Coal," to be delivered not later than Friday, the 15th inst.

John Haslam,
Town Clerk.

Corporation Offices: Bank Street, Bury,
June 1, 1900.

RHONDDA URBAN DISTRICT COUNCIL,
(Gas and Water Department.)

TENDERS FOR COALS AND PIPES.

THE Council are prepared to receive TENDERS for the following:—

1.—The supply, from the 1st of July, 1900, to the 30th of June, 1901, of 12,500 Tons of GAS COALS, delivered at Porth and Ystrad Gas-Works.

2.—CAST-IRON PIPES, required from the 1st of July, 1900, to the 30th of June, 1901.

Specifications and Forms of Tender can be obtained on application to the Engineer and Manager, Mr. Octavius Thomas, Gas and Water Offices, Pentre, R.S.O.

Tenders, to be addressed to the Chairman of the Gas and Water Committee, endorsed "Tender for Coal" or "Tender for Pipes," and delivered at my Office on or before Ten a.m., Friday, the 22nd of June, 1900.

The Council do not bind themselves to accept the lowest or any Tender.

Walter H. Morgan,
Clerk.

Council Offices, Pentre, R.S.O., Glam.,
May 30, 1900.

LINCOLN CORPORATION
(Gas Department.)

TENDERS FOR COAL.

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 26,000 Tons of screened GAS COALS and NUTS, to be delivered during a period commencing the 1st of July, 1900, and terminating the 30th of June, 1901.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 16th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

Jno. Carter,
Manager.

Gas Offices, Lincoln,
May 24, 1900.

LINCOLN CORPORATION.
(Gas Department.)

TENDERS FOR TAR.

THE Gas Committee of the Corporation of Lincoln are prepared to receive TENDERS for the purchase of the surplus TAR (about 1200 Tons) produced at their Works during the period of One Year commencing on the 1st of July, 1900.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Residuals," must be delivered at the Gas Offices, Lincoln, on or before the 16th of June next.

The Committee do not bind themselves to accept the highest or any Tender.

Other Particulars may be obtained of the undersigned.

Jno. Carter,
Manager.

Gas Offices, Lincoln,
May 24, 1900.

URBAN DISTRICT COUNCIL, BOROUGH OF NEWRY.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of from 3000 to 3500 Tons of best screened GAS COAL for a period of Twelve Months, to be delivered in such quantities and at such times as may be required by the Committee, and to weigh 20 cwt. to the ton over the Gas Committee's Weighbridge at their Works (said Machine regularly inspected by officer under "Weights and Measures Act"), and delivered *free ex* Ship or Steamer at Albert Basin, Newry.

The Coal to be Fresh Wrought, Dry, and Free from Hards, Smudge, Dirt, Shale, Pyrites, or other objectionable Matter for Gas Making.

Further Particulars may be obtained from Mr. A. Gibb, Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, and where raised, to be addressed to John Treanor, Esq., Chairman, and delivered to the undersigned not later than Eleven a.m., on Friday, the 15th of June.

The Committee reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender. They also reserve the power to decline acceptance of any Coal *not equal* to that contracted for.

By order,
R. H. Doherty,
Clerk.

New Town Hall, Newry,
June 1, 1900.

THE INCORPORATED

Gas Institute.

THE THIRTY-SEVENTH

ANNUAL GENERAL MEETING

OF THE MEMBERS

WILL BE HELD ON

TUESDAY (10.30 a.m.) and WEDNESDAY (10 a.m.),

the 12th and 13th of June, 1900,

AT THE

ROYAL UNITED SERVICE INSTITUTION,

WHITEHALL, LONDON.

The Chair will be taken by the President,

E. HERBERT STEVENSON, Esq., M.Inst.C.E.

In connection with the Meeting an EXCURSION TO PARIS has been arranged, starting on Wednesday evening, June 13. Full Particulars are announced in the Programme.

THE BENEVOLENT FUND.

The Annual General Meeting of the Donors and Subscribers to the Benevolent Fund will be held on Tuesday, June 12, at the close of the sitting, about One p.m.

WALTER T. DUNN, Secretary.

13, *Victoria Street, Westminster, S.W.*

CHIPPING NORTON GAS COMPANY.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Company invite TENDERS for the supply of from 500 Tons to 1100 Tons of best screened GAS COALS, to be delivered f.o.r. at the Gas-Works Siding, in such quantities and at such times as the Manager may direct, for a period of Six or Twelve Months, from July 1 next.

Sealed and endorsed Tenders to the Secretary, Gas Company, Chipping Norton.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Ashton Gas Company invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at their Works during Twelve Months commencing Aug. 1 next.

Probable Quantities: Tar, 2000 Tons; Ammoniacal Liquor, 3500 Tons of 6°.

Tenders, duly endorsed, to be delivered at the Company's Offices on or before Saturday, the 16th day of June inst.

Bardsley Elson,
Secretary.

Gas Offices, Ashton-under-Lyne,
June 1, 1900.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee invite TENDERS for the TAR and AMMONIACAL LIQUOR, to be produced at their different Gas Stations for a period of One or more Years, commencing the 1st of July next.

The yearly make of Tar is about 8000 Tons, and of Ammoniacal Liquor about 2,500,000 Gallons.

Particulars and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, June 19, 1900.

A. Nicholson,
Town Clerk.

Oldham, May 24, 1900.

ROCHESTER, CHATHAM, AND STROOD, GASLIGHT COMPANY.

GAS COAL.

THE Directors invite Tenders for the supply of about 30,000 Tons of GAS COAL, to be delivered between the 1st of July, 1900, and the 28th of February, 1901.

Further Particulars, with Forms of Tender and Contract, may be had on application.

Sealed Tenders, marked "Coal," are to be delivered, addressed to me, at these Offices not later than noon of Wednesday, the 13th of June, 1900.

J. M. Veevers,
Secretary and General Manager.

Gas Offices, Rochester,
May 31, 1900.

THE Urban District Council of Hindley are prepared to receive TENDERS for the supply of GAS COAL, CANNEL, ENGINE SLACK, and LIME, required at their Gas-Works during the ensuing Twelve Months, and also for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Gas-Works during the ensuing Nine Months.

Full Particulars, with Form of Tender, can be obtained on application to Mr. William Dickinson, Gas and Water Manager.

Sealed Tenders, endorsed "Tender for Gas Coal, &c.," to be lodged with the undersigned not later than Monday, June 18, 1900.

By order,
Stephen Holt,
Clerk to the Council.

Offices: Cross Street, Hindley,
May 29, 1900.

BOROUGH OF RAMSGATE.
(Gas Department.)

THE Gas and Water Committee desire TENDERS for the construction of a RETORT-HOUSE; also IRON ROOF, JOISTS, &c.

Specifications and Quantities may be obtained from William A. M'Intosh Valon, Gas Offices, Ramsgate, on payment of £5 5s., which will be returned on receipt of a *bonâ-fide* Tender, together with Specifications and Quantities fully priced out.

Tenders must be sent in, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, not later than Ten a.m. on Monday, June 11, 1900.

The Committee do not bind themselves to accept the lowest or any Tender.

W. A. Hubbard,
Town Clerk.

CORPORATION OF LANCASTER.
(Gas Department.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of screened GAS COAL and CANNEL, delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required during a period of One Year, commencing delivery Sept. 1 next.

Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal and Cannel offered, must be delivered to T. Carn Hughes, Esq., Town Clerk, Lancaster, on or before June 16 next.

Any further Information and Forms of Tender may be obtained on application to the undersigned.

C. Armitage.

Gas-Works, Lancaster,
June 1, 1900.

HORLEY DISTRICT GAS COMPANY, LIMITED.

GAS-MAINS.

THE Directors of the Horley District Gas Company, Limited, are desirous of receiving TENDERS for the supply of 3000 yards of 8-inch, 3000 yards of 6-inch, and 4000 yards of 4-inch CAST-IRON SOCKET and SPIGOT GAS-MAIN PIPES, together with necessary CONNECTIONS, SYPHONS, &c., to be delivered, free of all charges, at Crawley and Three Bridges Stations, L.B. & S.C. Rly.

Time of delivery to be definitely stated.

Sealed Tenders to be addressed to the Chairman of the Horley District Gas Company, Limited, and delivered at the Company's Offices: 147, Dashwood House, New Broad Street, London, E.C., not later than Twelve o'clock noon on the 11th inst.

By order of the Board of Directors,
Richard Sandell,
Secretary.

June 1, 1900.

CITY OF HEREFORD.

THE Gas Management Committee of the Corporation invite TENDERS for the supply of best screened large GAS COAL for One Year, from the 1st of August next, to be delivered free at the Gas-Works Siding, Hereford, in such quantities as may be required from time to time.

The estimated Quantity required will be about 9500 Tons.

Full Particulars and printed Forms of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Tender for Gas Coal," are to be sent in addressed to the Chairman, Gas Management Committee, Mansion House, Hereford, by Saturday, June 9.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
William Parlby,
Gas Engineer and Manager.

Gas-Works, Hereford,
May 23, 1900.

GUILDFORD GASLIGHT AND COKE COMPANY.

TO TAR DISTILLERS.

THE Directors of the above Company are prepared to receive TENDERS for the surplus COAL GAS TAR and CARBURETTED WATER GAS TAR, separately or mixed, produced by the above Company, for the Year ending the 30th of June, 1901.

Coal carbonized, about 12,000 Tons per annum.

All Tenders to state the Price per Cask of 40 Gallons.

Cartage to and from Railway Station, Guildford, free. All Empties to be provided by Contractor.

Tenders, endorsed "Tar," to be sent to David Williamson, Esq., J.P., Chairman of the Gas Company, Guildford, on or before Wednesday, June 20, 1900.

By order,
William Titley,
Secretary.

Gas Offices, Guildford,
May 29, 1900.

COUNTY BOROUGH OF WEST BROMWICH.
(Gas Department.)

TO COLLIERY PROPRIETORS.

THE Gas Committee are prepared to receive TENDERS for the supply of 32,000 Tons of GAS COAL, for use at their Works, Albion, West Bromwich.

The Committee do not bind themselves to accept the lowest or any Tender; and they reserve to themselves the right to divide the Contract between several Firms.

Forms of Tender may be obtained on application to Mr. Thomas Glover, Manager of the Works.

Sealed Tenders, properly endorsed, to be sent to me not later than Monday, the 11th of June.

By order,
Thos. Hudson,
Secretary.

Town Hall, West Bromwich,
May 26, 1900.

LEAMINGTON PRIORS GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Leamington Priors Gas Company are prepared to receive TENDERS for the supply of the GAS COAL required by them during Twelve Months from the 1st of July next.

Particulars and Forms of Quotation may be obtained from the undersigned.

Tenders must be sent in on or before Thursday, the 7th of June, 1900.

THOMAS BERRIDGE,
Engineer and Secretary.

BOROUGH OF DUKINFIELD.

TENDERS FOR GAS COAL.

THE Gas Committee require Tenders for 8500 Tons of screened GAS COAL, one-half to be delivered before the end of September next, and the remainder by the end of June, 1901, by Road, Rail, or Canal (Peak Forest).

For Forms of Tender apply to the undersigned.

Tenders to be delivered at the Gas Offices, not later than the first post on Monday, the 25th inst., addressed to Mr. Councillor Stafford, Chairman of Gas Committee.

HARRISON VEEVERS, C.E.,
Engineer and Secretary.

Gas Offices, Dukinfield,
June 1, 1900.

TENDERS FOR GAS COAL.

THE Magistracy of Copenhagen are prepared to receive TENDERS for the supply and delivery of 60,000 Tons of best GAS COAL from August, 1900, until the end of January, 1901. The Magistracy reserve the right to divide the Contracts between two or more Contractors.

Further Information and Conditions for the delivery may be obtained on application to Københavns Belysmugsvæsen, Vestre Boulevard, København, V.

The Tenders, sealed and marked "Tilbud paa Kul," to be sent to Magistratens 4' Afdelnig, Lavendels trade 1. København, K., before the 25th of June, 1900, at Twelve o'clock, at which time the Tenders will be opened in the presence of the parties tendering, who are in attendance.

THE MAGISTRACY OF COPENHAGEN.

May 26, 1900.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Barnsley Gas Company invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at their Works during a term of One Year commencing July 1 next.

Probable Quantities, and any other Particulars, on application to the undersigned.

Tenders, duly endorsed, addressed to the Chairman, to be delivered to me not later than Thursday, the 7th day of June prox.

The Directors do not bind themselves to accept the highest or any Tender.

By order,
W. W. HUTCHINSON,
Engineer and Manager.

Gas Offices, Barnsley,
May 28, 1900.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to receive TENDERS for the supply of the whole or part of 9000 Tons of the Best Screened GAS COALS and 1000 Tons of CANNEL, to be delivered free at Macclesfield in such quantities as may be required, and to weigh 20 cwt. to the ton over the Committee's Weighing-Machine at their Works.

Forms of Tender and Conditions may be had on application to the Engineer, Gas-Works, Macclesfield.

Tenders, sealed and endorsed, to be sent in not later than Saturday, the 9th day of June, 1900, addressed to the Chairman, Gas Committee, Town Hall, Macclesfield.

The Committee do not pledge themselves to accept the lowest or any Tender.

W. FREDK. TAYLOR,
Town Clerk.

May 9, 1900.

STAINES RESERVOIRS JOINT COMMITTEE.

INCORPORATED BY ACT OF PARLIAMENT, 59 AND 60 VICT., CAP. 241.

ISSUE OF £300,000 £3 PER CENT. DEBENTURE STOCK.

Payment of Interest guaranteed by the three following Companies:—

The West Middlesex Water-Works Company,
The Grand Junction Water-Works Company, and
The New River Company, jointly and severally.

NOTICE is Hereby Given, that the Joint Committee are prepared to receive TENDERS for the above Amount, being a further Portion of the DEBENTURE STOCK created by the above Act and by the Act of 1898, bearing Interest at £3 per cent. per annum, payable Half Yearly, and redeemable after the expiration of 25 Years from the date of issue, subject to Six Months' Notice being given by the Committee.

The Staines Reservoirs Act, 1898, authorizes Trustees to invest Trust Funds in this Stock.

Tenders must be delivered at the Office of the Committee, No. 19, Marylebone Road, N.W., not later than Two o'clock p.m. on Wednesday, the 20th of June next.

Particulars and Conditions, together with Form of Tender, may be obtained at the said Office, or will be forwarded on application; also of Messrs. Hollams, Sons, Coward, and Hawksley, Solicitors, 30, Mincing Lane, E.C.; and Messrs. Prescott, Dimsdale, and Co., Limited, Bankers, 50, Cornhill, E.C.

By order of the Joint Committee,
F. H. WYBROO,
Secretary.

Office of the Committee: 19, Marylebone Road, London, N.W., May 22, 1900.

TENDERS FOR TAR.

THE Directors of the Croydon Commercial Gas and Coke Company invite TENDERS for the purchase of their surplus TAR for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on application. Rail communication direct to the Works.

Tenders, endorsed "Tender for Tar," must be delivered not later than Thursday, the 7th of June, to

WILLIAM J. RUSSELL,
Secretary.

Katharine Street, Croydon,
May 25, 1900.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCK and BONDS, WILL BE CLOSED at One o'clock p.m. on Saturday, the 9th prox., for the Half Year ending on the 30th prox., and WILL BE RE-OPENED on the morning of Monday, the 11th prox.

The Interest for the Half Year will be payable on the 2nd of July next to the Proprietors registered on the closing of the Books.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., May 29, 1900.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

ISSUE OF £4500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, AND £750 NEW ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.

NEW ISSUE OF 170 £10 "B" SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HERNE BAY GAS AND COKE COMPANY, LTD.

NEW ISSUE OF 1000 £5 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
CRAWLEY GAS COMPANY, LIMITED.

THE FREEHOLD GAS-WORKS SITUATE AT CRAWLEY, SUSSEX.

Conveniently placed close to the Main Road, within about half-a-mile of Crawley Station on the London, Brighton, and South-Coast Railway, and comprising Retort-House (with Nine Retorts), Two Gasholders, Purifiers, Scrubber, Coal-Store, Lime-Shed, Tar-Well, Meter and Governor House, Manager's House, together with the Mains to a length of about 3½ miles, Meters, Services, and Tools. The whole to be sold as a going concern, and with possession on completion.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, June 12, 1900, at Two o'clock.

Particulars of the SECRETARY of the Company, at the Offices, High Street, CRAWLEY; of Messrs. HOLMES, LEAR, AND FELDAM, Solicitors, ARUNDEL; and of Mr. ALFRED RICHARDS, Auctioneer, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

£2900 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Friday, June 29, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

FENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TAR AND AMMONIACAL LIQUOR.

THE Gas Committee invite Tenders for the purchase of their Surplus TAR and AMMONIACAL LIQUOR for One Year commencing on the 1st day of July, 1900.

Form of Tender and further Particulars may be obtained from Mr. Robt. Surtees, Engineer and Manager.

Tenders to be sealed and endorsed "Tender for Tar and Liquor," addressed to the Chairman, Gas Committee, Gas-Works, Fenton, Staffs., and delivered not later than Saturday, June 16, 1900.

The Committee do not bind themselves to accept the highest or any Tender.

H. J. CRUTCHLEY,
Secretary.

Gas Offices, Fenton,
June 2, 1900.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS in respect both to the FOUR-AND-A-HALF PER CENT. and THREE PER CENT. DEBENTURE STOCKS, WILL BE CLOSED from the 14th of June to the 30th of June inst. inclusive, and RE-OPENED on the 2nd of July prox.

By order,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place, Bishopsgate, E.C.,
June 2, 1900.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCK, WILL BE CLOSED at Ten o'clock forenoon on Friday, the 8th inst., for the Half Year ending the 30th of June, 1900, and will be RE-OPENED on Friday, the 15th inst.

The Interest for the Half Year will be payable on the 2nd day of July next to the Proprietors registered on the closing of the Books.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices of the Company: Willoughby Lane,
Tottenham, June 1, 1900.

Now Ready. Price 6s.

LAW
OF
LONDON GAS COMPANIES

A SYNOPSIS of Public Acts affecting Gas Companies and of the Special Acts of the Metropolitan Companies, with Comments and a Short History: Including a Statement of the effects of the Conversion Acts of the GASLIGHT AND COKE COMPANY, and of the SOUTH METROPOLITAN COMPANY, and an Examination of the Capital and Loan Accounts to date of the three London Companies and of the Bills now before Parliament.

BY
T. J. BARNES,
OF THE MIDDLE TEMPLE, *Barrister-at-Law.*

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

HARDMAN & HOLDEN, LD.

ESTABLISHED 1820.

SULPHURIC ACID.

GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

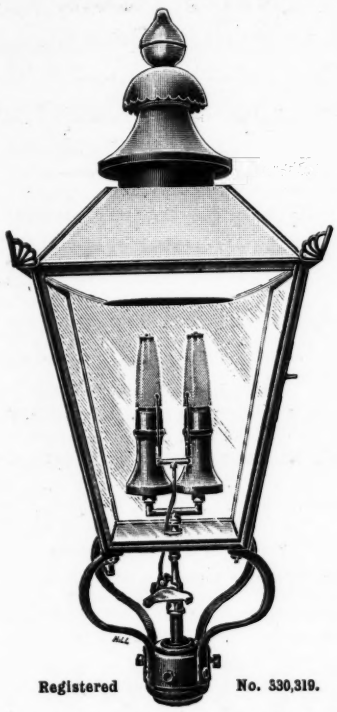
Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.

Head Office: Miles Platting, MANCHESTER.

Inquiries Solicited.

THE

"KILBURN" LANTERN.



Registered No. 330,319.

Fitted with Steel Enamelled White Reflector.

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STEEL OF ALL DESCRIPTIONS.

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BOLDON GAS COALS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

As per Analysis by

Mr. JOHN PATTINSON, F.I.C., F.C.S.

For Prices, &c., apply to

W. H. PARKINSON,

THE HARTON COAL CO., LTD.,

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NITRATE of Thorium and Cerium. FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

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Absolutely the STRONGEST and CHEAPEST Lantern in the Market.

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Adopted for Lighting ST. JAMES'S PARK *and around* BUCKINGHAM PALACE.

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GAS ENGINEER,

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Prices are Reduced.

HOT WATER INSTANTLY.

NIGHT OR DAY.

Hot Bath when wanted.

Boiling Water in a Minute.

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For Gas or Oil.

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Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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CANDLE SAFETY LAMPS
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

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FOR
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For use in the
RECOVERY OF SULPHUR,
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Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
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HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
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THE GRASSMOOR CO., Ld.,
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LONDONDERRY GAS COALS
FROM THE
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Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
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Gas Companies are solicited to try Samples of the
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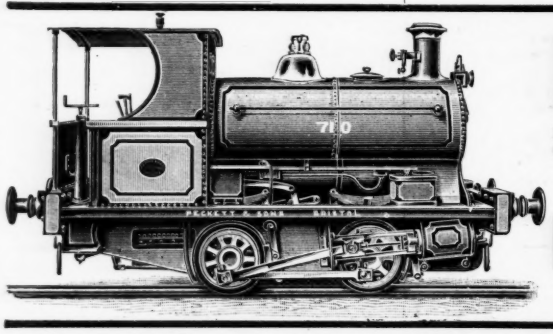
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, near DEWSBURY.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.
Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.



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LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for Immediate Delivery.
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Analysis: 12,600 Feet of 19-Candle Gas per Ton.
Value in Pounds of Sperm, 820·80.
VERY FREE FROM IMPURITIES.
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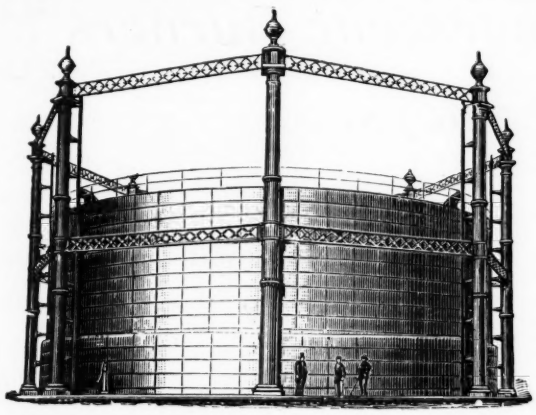

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References to 600 Works already erected.

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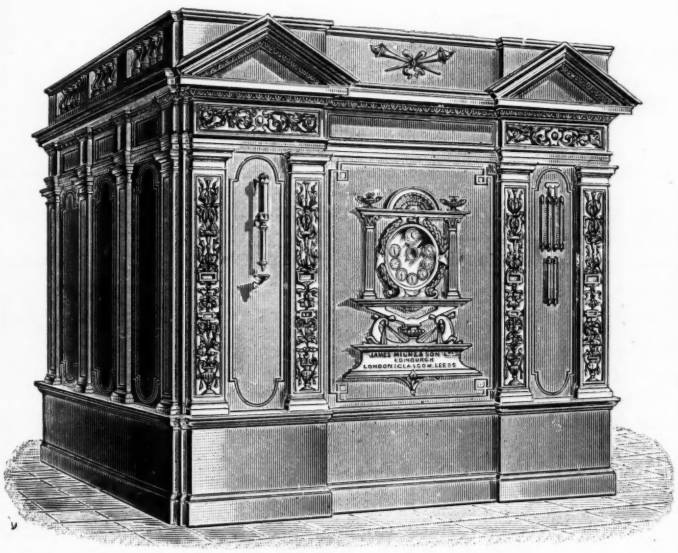

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RECENTLY ERECTED AND IN HAND.

GLASGOW	150,000	cub. ft. per hour.
DUNDEE	150,000	,, ,,
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WOOLWICH	50,000	,, ,,
LINCOLN	45,000	,, ,,
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The Pioneers of Incandescent Burners without Chimneys.

THE "SMALL TORCH" Burner (Bandsept Patent) for Street Lighting, consuming **3½** feet of Gas per Hour, having an efficiency of **25-Candle Power per Cubic Foot of Gas** consumed at ordinary pressure, is not only the **BEST** but **CHEAPEST** intensive **CHIMNEYLESS** Burner on the Market.

PRICE COMPLETE WITH MANTLE

4s. 9d.

All other Burners supplied by the Syndicate proportionately reduced, full Particulars of which will shortly be issued to the Trade, and followed by new and complete Catalogue.

ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

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THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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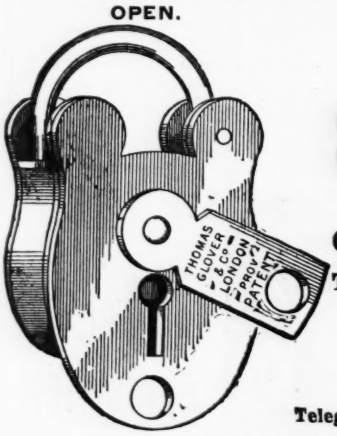

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SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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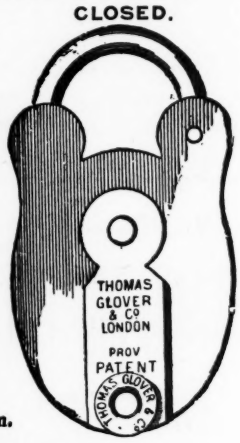

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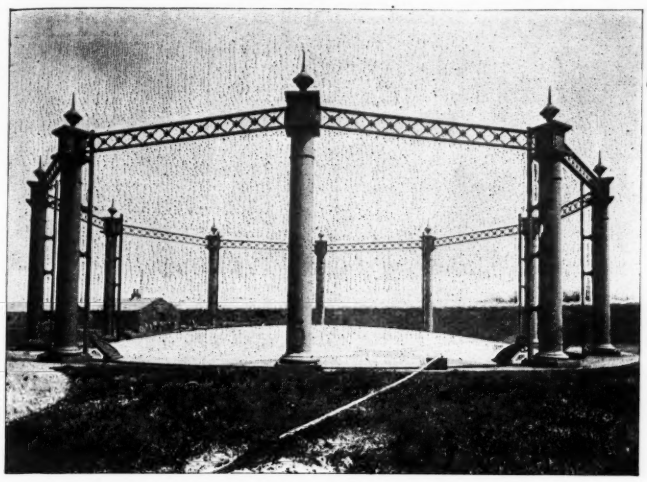
GASHOLDERS



A GASHOLDER

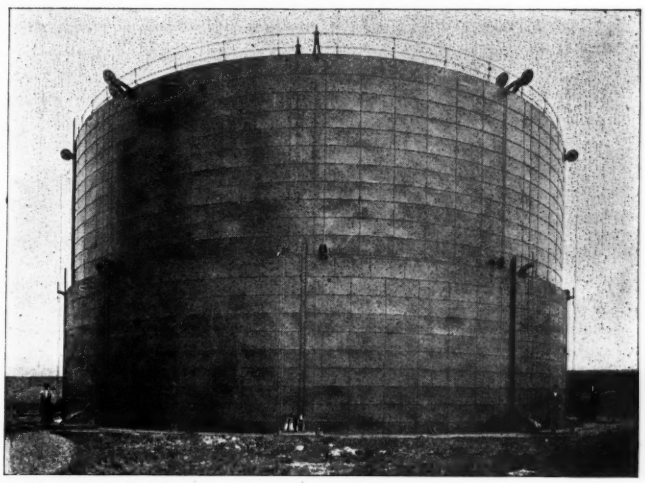
Guided by Ten massive Cast-Iron Columns and Girders is shown in the accompanying Photo.

AS IT WAS

originally erected by us

IN 1883.

We last year took down the Guide-Framing, converted the Holder into a Two-Lift; and this Photo. ☛ shows it



AS IT IS NOW

entirely guided by our Patent Steel Cable System.

In many other instances, Columns have been sold and replaced by our Cables.

We are prepared to alter any Holders in a similar manner to the above. Engineers who have trouble with the irregular working of Column-Guided Holders, will find the Cable System vastly superior and quite reliable.

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GAS AND ELECTRICAL ENGINEERS,

MANUFACTURERS OF

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Telegrams: "Gasholder, Stockton-on-Tees." "Apparatus, London."

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GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

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UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS

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ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

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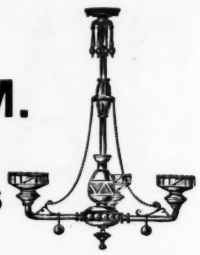

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TAPPING MACHINES

FOR

Drilling & Tapping

PIPE UNDER PRESSURE WITHOUT ANY ESCAPE OF GAS.

Combination Drills and Taps from ½ to 4 inches.

ADOPTED BY PRINCIPAL GAS COMPANIES THROUGHOUT THE UNITED STATES.

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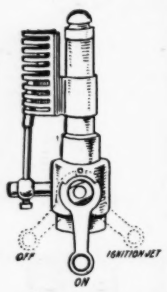
For Ordinary Burner.



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NO MATCHES, TAPERS, &c., REQUIRED.

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The Matchless Gas Lighting Syndicate, Limited,

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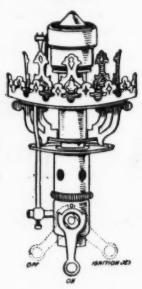
For Incandescent Burner.



Price 3/- each, without Burner or Mantle.

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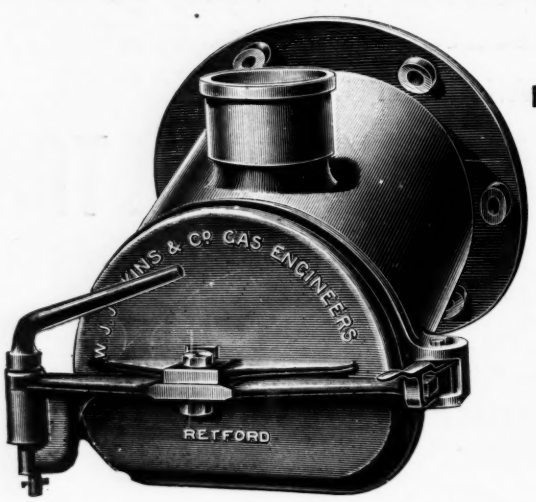
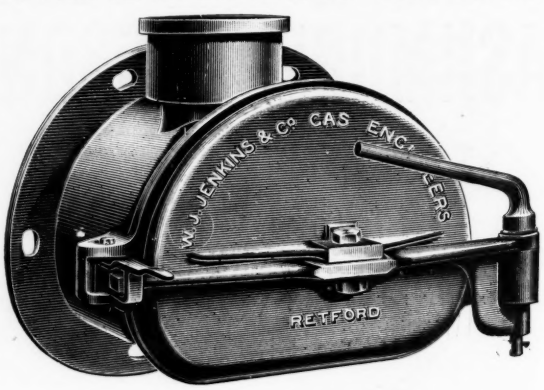
WITH SELF-SEALING LIDS FOR HORIZONTAL AND INCLINED RETORTS.





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HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

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JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
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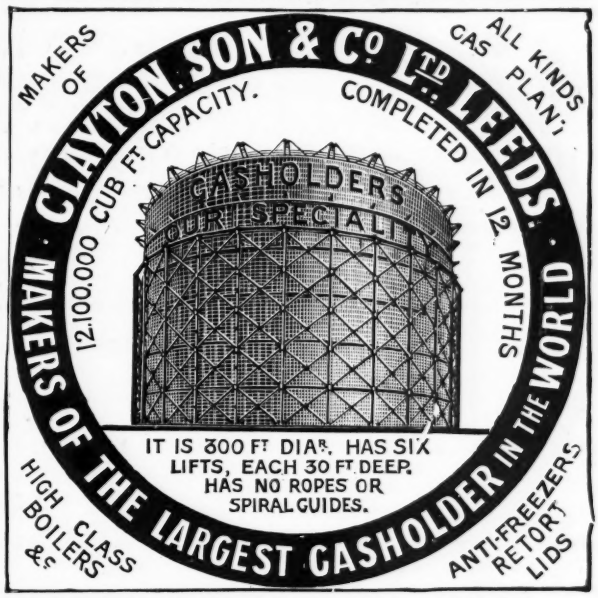
MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.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12,100,000 CUB FT CAPACITY.
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OUR SPECIALITY
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
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Purifiers, Superstructure, and Lifting Apparatus erected at the Gas-Works, Northampton.

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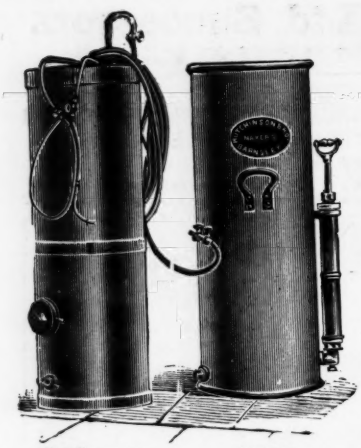

Gas-Generator. Air-Blower.
IMPROVED LEAD-BURNING APPARATUS.

HUTCHINSON BROS. & CO., LTD.

GAS ENGINEERS, &c.

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LEAD WORK FOR SULPHATE OF AMMONIA PLANTS.

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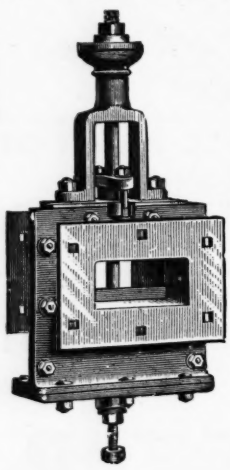

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